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Here is What Hudson Thinks of the Future—

Perhaps if told in the language of dollars our optimism in the immediate future will be best understood.

We were just completing a large addition to the factory which was to have been used for other purposes when the signing of the armistice released it to us. So we are going to use it in building more automobiles this year than we have ever turned out in one year. The total value will reach \$56,000,000.

We are putting a million and a half dollars into machinery. We will give Hudson dealers the greatest money-making opportunity they have ever enjoyed.

Dealers have profited with Hudson. Note the type of distributors and dealers that sell the Hudson. They are the most prominent and successful in their respective communities. They have the finest stores. They are the solid business men of the line. They have made money because the Super-Six is a good car, because it is well merchandised and because we have been able to give them profitable deliveries. But we have never been able to furnish all the cars they could have used. When other cars were not selling, dealers were having a time getting what Super-Sixes they needed.

December, for instance, was the biggest December, in Hudson history, in actual retail sales.

Now Hudson dealers are to have more cars. Combined they will share in more than twelve million dollars in profits during the coming twelve months. Wouldn't you like to share in some of that money? If you would, write us; there may be an opening worth while. At any rate it's worth trying for.



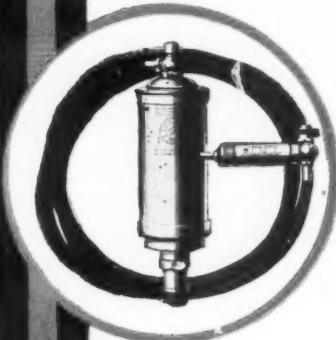
(B)

Hudson Motor Car Company
Detroit, Michigan

UTILITY

Automotive Products

Safeguard Your Owners' Health
With a Good Big Selling Point



UTILITY Pump
for All Cars
\$12.00
For Fords \$7.50



Let A
UTILITY Protected Heater

Make Your Cars More Safe To Ride In

This winter, of all winters, your prospective customers—getting more numerous daily, as the army comes home—consider their health as a big factor in buying a car.

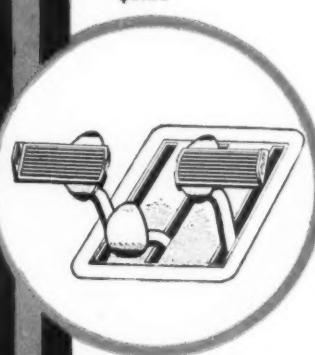
A comfortably heated car is a first precaution against the dangers of influenza. It is a precaution your owners will consider well in buying.

It is your privilege to look after the welfare of your patrons by supplying heating facilities as standard equipment.

Manufacturers installing UTILITY Protected Heaters in their cars know that they will serve them well. *A model for every car—at a moderate price.*

Write concerning your standard equipment requirements.

UTILITY Pedals
for Fords
\$1.25



LOOK FOR THIS TRADE MARK



UTILITY Rim
Wrench for
All Cars
\$1.75

Truck Manufacturers—Make the
Utility Heater standard or optional equipment

UTILITY
Universal Wrench
Set for All Cars
\$3.50



HILL PUMP VALVE CO.

Mfrs. of UTILITY Products
Archer Avenue and Canal Street, CHICAGO

Sales Department
THE ZINKE CO., 1323 South Michigan Ave., Chicago

UTILITY Disappearing Truck Body
for Fords—Price \$38.50



LOOK FOR THIS TRADE MARK

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

VOL. XL

NEW YORK—THURSDAY, JANUARY 23, 1919—CHICAGO

No. 4

Still Higher Standards Are Needed

If America Is to Compete Successfully
for World Trade She Must First
Set Up the Mark of Quality

IT IS TIME TO BUILD FOR A PERMANENT BUSINESS

Constructive, Institutional Establishments Must Replace
Those of Transient and Short-Lived Dividend Production

By H. M. Swetland
President United Publishers Corp.

THREE are many lessons which the American manufacturer can learn from Europe, particularly from England.

The war has performed a great service to both England and France in forcing them into production on a scale which classes their manufacturers among the great quantity producers of the world.

They have learned to use automatic machinery and progressive assembly and the utility

of unskilled labor for all routine operations.

Manufacturing plants have been doubled and quadrupled in size and equipment, with modern and permanent construction and facilities for labor saving and maximum production, and the number of employees has been correspondingly increased, ranging from five to forty thousand in automotive, shipbuilding and general munition plants.

This enormous pro-

Mr. Swetland, who is also President of the Class Journal Co., on January 2 returned from Europe, where he traveled extensively through England, Scotland and France as a member of a party of American business paper representatives who were the guests of the British Government. The party was afforded unusual opportunity of investigating social environment, industrial activities and matters pertaining to war

ductive capacity, well organized and fully equipped, will rapidly evolve from the production of munitions and instruments of war into the manufacture of the necessary and luxurious commodities of life.

Further, the British Government during her later war period has fostered the reconstruction of her industries, *and the automotive manufacturer is in some instances well in advance of reconstructed production.*

Some Post-War Models Ready

For example—The Rolls-Royce plant has its product fully determined. It will build two cars—one a large car of practically the same character as the present model, to which will be added a small car, a four-seater with a smaller engine, which will have the Rolls-Royce character in materials and workmanship, but will have less capacity.

The Austin car, which is fully designed and ready for the market, presents many points of interest. In the first place, it has a very artistic and well-finished design. You have to look for the top. It disappears in a little pocket back of the rear seats covered with a narrow leather apron, and is entirely unobservable unless you look for it. This, of course, also protects the top.

Specialized Refinement in Design

This pocket keeps the top clean and dry and renders it easily available in case of emergency. Then the seating is an entirely new feature. There are four seats, two in front and two in the rear, which are adjustable to the passenger, both in height and in the inclination of the back. The back of the seat is high, having a projecting roll at the top which is fitted to the passenger, making a thoroughly comfortable seat for a long journey.

While the design of the car at the rear gives no evidence whatever of a compartment for tires, the entire back opens into a rear door, which discloses a compartment which carries two tires, tubes, tire tools and everything necessary for quick repairs. It is a thoroughly concealed compartment which is not observable as you look the car over.

The complete housing of top and spare

tires permits an exterior entirely unmarred by protuberances.

These illustrate some of the points of superiority in design referred to.

Substantial Methods Inherited

Nothing short of a close personal investigation will give the correct impression of the strength and solidity of a British or Continental enterprise.

They seem to have formed the habit or to have inherited the idea of doing things in a strong, substantial way, and the result is that their enterprises run through from generation to generation, improving with each decade in strength and solidity of purpose.

It is at least an English trait of character, evidenced in their architecture of both public and private buildings, their shipping, and the full line of manufactured products. *They construct for durability and have not neglected design.*

Take one look at their locomotive. It is a finished product of harmonious design and utility not to be seen in the same product of any other country.

England Looking to World Markets

If England has learned quantity production, if she builds for quality and durability, if she is sensitive to design and finished product, with her great munition factories yawning for production, is it not fair to assume that she is looking with confidence to the markets of the world?

This is the day of reconstruction.

With all due respect to the quality of American products, which, in many instances, equal or excel those of any other country, if America is to compete for the markets of the world, these conditions of foreign production must have serious consideration.

We Must Develop QUALITY

Has not the time arrived when the American manufacturer should set up first the mark of high quality?

Should not the manufacturer take more pride in the quality of his product and the service which it renders to the world than in

the number of dollars that can be squeezed out of it?

It seems to be all a question of the ultimate desire back of the manufacturer.

If the most important point is the production of large profits and quick dividends then it is perhaps wise to turn out a product which will pass muster in the salesroom, get the check and let the consumer worry about the quality.

Adequate Inspection Vital

But if the desire is a permanent business, well established, with satisfaction to manufacturer, merchant and consumer, then it is time to produce the greatest possible quality, using substantial and well-tried materials, coupled with workmanship adequate to the conditions, followed by an inspection which really inspects and rejects all imperfections.

The matter of inspection and rejection needs the attention of the manufacturer in our automotive industry. Too many glaring imperfections are passed along to the consumer.

These things should be coupled still further with the European idea—particularly in France—of combining excellent workmanship and good materials with artistic design.

More criticism of the Liberty engine was offered among the great manufacturers of England because of its design and general appearance and finish than on the performance of the product on which America spent so many millions.

Reconstruction is at hand.

The world is entering on new conditions.

The question of the adjustment of labor and capital, as well as the question of raw materials, transportation and matters of legislation, is to receive a severe shake-up in the next ten years.

It is time to build for a permanent business.

American manufacturing enterprise must now evolve from transient and short-lived dividend production to an institutional, permanent and constructive establishment which will outlive its progenitors and establish the solidity of American industry in the future markets of the world.

R. E. 7 (Reconnaissance Experimental) Biplane



This machine was built at the Royal Aircraft factory and was used as a self-protecting artillery observation machine, night bomber and contact patrol machine. It is fitted with a 138-hp. R. A. F. 12-cylinder engine

Radiator Cooling Fans

The Fan the Controlling Factor in Any Cooling System—Fan Design, Mounting and Drive—Advantages of Fan Housings—Proper Location of Fan Relative to Housing

By Louis Schwitzer*

THE problem of cooling, in all water cooled road vehicles, resolves itself into a question of how much air can be passed through the radiator. Researches have shown that when other conditions are reduced to uniformity, the heat dispersal varies directly with the quantity of air drawn through the radiator. Therefore, the fan is the governing factor in cooling, and the determination of its correct type and its installation are of utmost importance. The fundamental condition of effective cooling is that a perfect balance has to be maintained between the heat units carried from the engine into the cooling water and radiator and the heat units disposed of by the radiator to the air passing through it. Expressed in the form of an equation,

B.t.u. imparted to cooling water = B.t.u. imparted to air.

To raise the temperature of 1 lb. of air 1 deg. Fahr., 0.2375 B.t.u. is necessary. The B.t.u. imparted to the cooling water can be determined from the horsepower output of the engine and its fuel consumption per horsepower hour. It is obvious from the above equation that with any given temperature rise a sufficient amount of air must be drawn through the radiator by the fan to secure a heat balance, from which we derive that

B.t.u. per minute imparted to cooling water

$$= \text{Air volume} \times \text{specific weight of air} \times 0.2375 \times \text{temperature rise of air.}$$

*President Automotive Parts Co., Indianapolis, Ind.

The B.t.u. per minute imparted to the cooling water in different types of engines may be taken at the following figures, which are sufficiently accurate for all practical purposes:

80 B.t.u. p. hp. per min. for overhead valve engines

100 B.t.u. p. hp. per min. for L-head engines

110 B.t.u. p. hp. per min. for T-head engines

The specific weight of the air can be taken as 0.071 lb. per cubic foot at 100 deg. Fahr. The question of the temperature rise of the air upon its passage through the radiator has been thoroughly treated by Mr. Modine of the Modine Mfg. Co., in his S. A. E. paper of last January. Reference is there made to the physical laws that the amount of heat given off is proportional to the difference in temperature between the radiating body and the air, and that the loss of heat by convection is nearly proportional to the difference in temperature between the hot body and the air. These laws indicate that we are interested in maintaining the surface of the radiator at as high an average temperature as is practical. A temperature rise of 25 or 30 deg. is well within the practical limit, and these figures may be used in the discussion here.

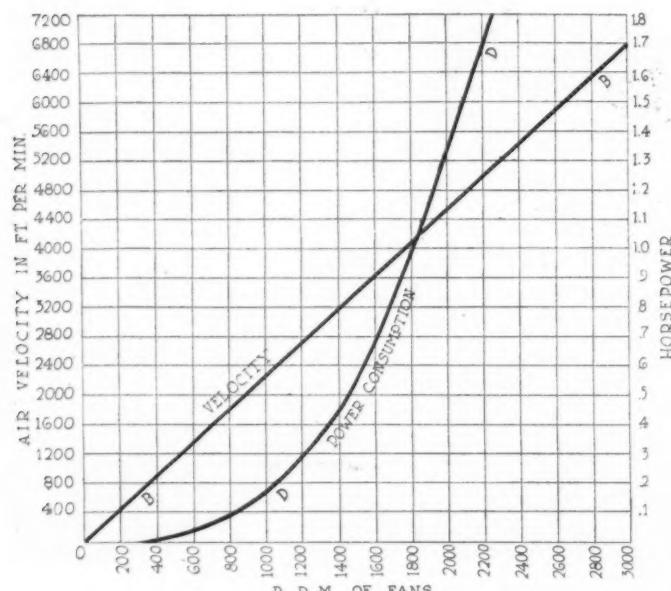
Limitation of Frontal Area

The air volume is a function of the open frontal area of the radiator, in square feet, and the air velocity in feet per minute. These are the two variables which determine the efficiency and economy of a cooling system. The frontal area is limited by construction details, such as width of frame, height of bonnet, etc., and cost. The size can be determined from the above equation after a consideration of these construction details and the assumption of a certain air velocity. The open frontal area varies between 75 per cent and 83 per cent of the total frontal area, depending on the construction of the radiator core.

If, then, from the above equation with a certain assumed air velocity, the required frontal area of the radiator is determined, it is necessary to design a fan to give this air velocity under conditions of maximum economy. Large diameter fans with comparatively low speeds will be selected.

The power required for operating fans increases very rapidly with the speed of revolution and all out of proportion with the relatively small increase in air velocity or volume. At the left is a typical air velocity and horsepower chart which shows this condition clearly.

A large fan will deliver the same volume of air at a lower speed than a smaller fan and use considerably less horsepower. For instance, to deliver 7000 cu. ft. of air per minute requires 2 hp. with an 18-in. fan, 1.4 hp. with



Speed-horsepower and speed-air velocity curves of fan

a 20-in. fan and only 1 hp. when a 22-in. fan is used.

After a fan of the proper diameter and type has been selected that will deliver the largest volume of air with regard to the horsepower and the necessary and desirable radiator frontal area, its proper installation must be considered.

With slow moving vehicles, such as trucks and tractors, where the initial air velocity due to the vehicular motion is negligible, fan housings should be employed to insure not only the most uniform air velocity through the radiator but also the maximum efficiency of the fan. To be able to use the largest diameter fan with a given frontal area this area should be as nearly as possible in the form of a square. This will allow of a simple and efficient fan housing.

The fan housing must be designed so that the fan will be entirely inside of it. Tests have proven that with a fan partly inside and partly outside the housing, the air velocity drops about 10 per cent and the horsepower required is increased 20 per cent, as against running the fan entirely inside the housing.

Below are the data of a test made with a 23-in. fan at different speeds, the fan being located first entirely inside the housing, and then half inside and half outside. The fan was directly coupled to the shaft of the dynamometer, to eliminate any slippage, and the radiator was mounted on a slide, so that observations could be made for different positions of the fan relative to the radiator housing.

RESULTS OF TESTS TO DETERMINE BEST POSITION OF FAN RELATIVE TO HOUSING

Test No.	Distance of fan from radiator core	Relation of fan to housing	R.p.m. of fan	Hp. required	Average air speed ft. per m.	Average air speed per hp. ft. per m.
1a	3 in.	1/2 in. inside	1000	0.572	1449	2535
1b	4 1/2 in.	Half out	1000	0.666	1305	1960
2a	3 in.	1/2 in. inside	1200	0.915	1692	1850
2b	4 1/2 in.	Half out	1200	1.06	1497	1402
3a	3 in.	1/2 in. inside	1400	1.43	2142	1500
3b	4 1/2 in.	Half out	1400	1.73	1803	1043

The fan housing must be deep to prevent sharp angles at the radiator corners, and the fan itself should not be too close to the rear face of the radiator core. There is no fixed rule for calculating the most efficient distance of the fan from the core, but tests should be made in each case to determine it. However, it will be found that when the diameter of the fan is practically equal to the width and height of the radiator core, there is little difference in the effects with this distance anywhere between 2 and 3 in. Fans of small diameter relative to the size of the core should be further from it, to be able to draw air through the corners and give a uniform air velocity through the total frontal area of the radiator. The opening in the fan housing should be such that the distance between the tip of the fan blade and the edge of the housing does not exceed 1 1/2 in., to prevent back drafts. Preferably the outer tip of the blade should be 1/4 in. from the edge of the housing toward which the fan blade moves when the belt is tightened and 1 1/2 in. from the opposite side. This gives an opening 1 3/4 in. larger in diameter than the fan. Direct gear or chain driven fans can, of course, be arranged in the center of the opening of the housing.

In passenger cars, where no housings are used, care should be taken that the fan is not brought too close to the radiator, as this contributes considerably to air noise. No fan housings are necessary, as the initial air velocities are great, and with the small amount of space available underneath the bonnet the housings would have to have such flat corners that they would be more a detriment than an advantage, on account of back draft around these corners.

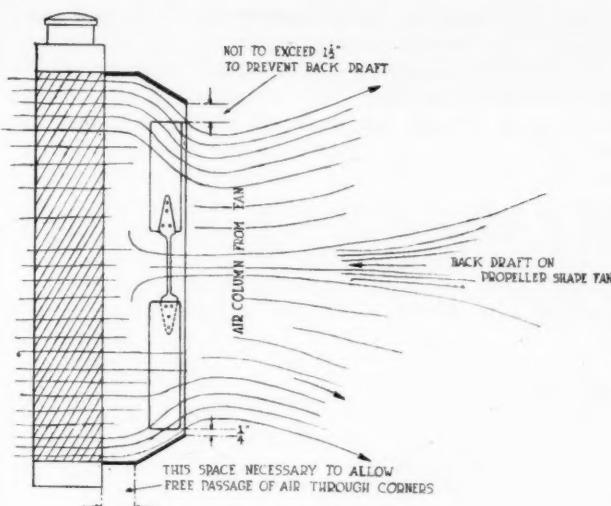


Diagram of fan housing

When designing a housing it is worth while to note the shape of the air column away from the fan. Contrary to common belief, there is no centrifugal discharge of air from the fan, but the air currents assume a hyperbolical shape, as shown in the illustration. This is due to the reverse current around the fan axis. With straight bladed fans this is not as pronounced as with propeller shape blades. On tests with the latter, back drafts have been measured behind the fan as high as 100 ft. per minute, forming a cone toward the center of the fan.

In order to obtain a positive air current through the radiator and to avoid back drafts, more importance should be paid—particularly in passenger cars and trucks—to the air outlet underneath the bonnet. The air expands a great deal under the hood, and with an inadequate outlet a static pressure is built up which seriously interferes with the capacity of the fan and relieves itself by backing out through the radiator. There should be at least 20 per cent more outlet area under the bonnet than the total open area through the radiator. Dust shields between the frame and the engine should not close up tight against the flywheel housing, particularly if the space between the toeboards and the crankcase is restricted, as is the case on most cars. A liberal opening should be left by inclining the dust shields toward the rear or putting louvres in. Many a case of serious heating trouble has been cured by providing ample openings in the dust shields or under-pans.

A good size opening through the under-pan or dust shields on both sides of the engine underneath the dash is much more effective than the louvres in the bonnet, as the motion of the vehicle (particularly of passenger cars) produces an injector action on the air under the bonnet which assists materially in the disposal of the hot air.

If louvres are cut in the bonnet, care must be taken not to get them too close to the radiator, as this would allow the fan to suck air through them, and naturally this would detract from the amount of air going through the radiator and reduce the cooling efficiency. By tests on various vehicles it has been observed that if the first louvre is placed 10 in. from the radiator there will be no negative drafts through it.

A proper size fan and housing will be useless unless means are provided to drive the fan and drive it efficiently for long periods. Therefore, the driving mechanism for the fan deserves serious consideration. Ample width and size of belts and large diameter pulleys must

be used. Sufficient belt contact must be provided to transmit the horsepower necessary to drive the fan positively without slippage and frequent adjustments even with the belt somewhat slack. No pulleys of less than 3-in. diameter should be employed on the fan, and, if flat belts are used, 1 1/4 in. should be the minimum width for any size of fan. With V belts, according to Graton & Knight, a 28-deg. angle is the most efficient, and a width of 5/8 in. at the top is the least to be employed. Manual belt adjustments have proved more successful than automatic take-ups. These latter give trouble due to spring breakage and undue vibration of the fan. There have been some successful automatic take-ups, but their cost is in most cases prohibitive for ordinary automotive road vehicles.

The fan as a whole should be given the same careful consideration as any other part of the tractor. Pressed steel fans are used most frequently, and are the strongest and lightest for a given diameter. The spiders and blades must be made from a good quality steel, strong enough to withstand the centrifugal stresses, rigid enough to prevent vibration, and perfectly balanced. The curve and angle of the blades must be chosen to give a maximum air velocity with a minimum horsepower requirement. The blade assembly should be bolted and not riveted to the hub, to allow an easy exchange, as the blades frequently get damaged through interference.

Failure of Bearings Troublesome

Failure of fan bearings has been the cause of the most irritating trouble, and the use of the proper bearings is, therefore, of the highest importance. In fact, 90 per cent of the failures of fans are due to improper bearing installation.

In a cooling fan there is both a radial load and a thrust load. The radial load is due to three distinct causes:

First, the weight of the parts supported, including the hub, pulley, blade assembly, etc.

Second, the static tension in the belt.

Third, the belt pull which drives the fan.

The belt pull is the total pull of the tight and loose sides of the belt. The factors determining this pull and the methods of ascertaining its amount are discussed below.

The load produced by the weights of parts resting on the bearing is in most cases very small, varying from 3 1/2 to 10 lb.

The personal equation enters into the adjustment of the fan belt, and consequently the load on the bearing resulting from the tension in this belt cannot be calculated, as it depends on how much force is used in tightening it. It has been found that even crowbars are used to tighten the belt, and this might easily bring the load up to several hundred pounds.

The belt pull is the resultant pull of the tight and loose sides of the belt, and can be figured from the following:

H = Horsepower transmitted

N = Speed of pulley in r.p.m.

R = Radius of pulley in inches.

The torque in lb.-in. is

$$T = \frac{63,025 \times H}{N}$$

and the tangential force in pounds on the rim of the pulley, or the effective belt pull, is:

$$P = \frac{T}{R}$$

P is equal to the difference between the tension T in the

tight side and the tension T_2 in the slack side of the belt—

$$P = T_1 - T_2$$

The tensions act approximately in the same direction and it is the sum of these tensions which produces the load on the bearings. Therefore, we must solve the formula

$$P_p = T_1 + T_2$$

and get the load produced by the belt pull.

Thrust Loads

On the other hand, the thrust load on the bearing is due to only one factor, namely, the pressure of the air column delivered by the fan. There have been many misconceptions about this thrust load. In ordinary fans, as used at present for radiator cooling, this load is practically negligible up to 30-in. diameter fans. It has been proved by calculation and actual tests to be less than one-twentieth of the radial load produced by a belt pull sufficient to transmit the torque. When considering the additional load put on by the belt adjustment and weight of the fan, the thrust load is still a smaller percentage of the radial load. The pressure per square foot is exerted by a moving air column

$$P_t = 5.2h$$

Where h is the velocity head in inches of water and V the velocity of air in feet per minute.

$$V = 4000 \times \sqrt{h}$$

$$\text{or } h = \frac{V^2}{16,000,000}$$

and from this formula we can solve

$$P_t = 5.2 \times \frac{V^2}{16,000,000}$$

In a test a fan was mounted so as to float on a shaft in such a manner that the end thrust was registered directly on a scale. It was found that an 18-in. fan running at 1750 r.p.m. and producing an air velocity of 2000 ft. per minute showed an end thrust of 3.25 lb. This coincides quite closely with the calculation below:

$$P = \frac{5.2 \times 4,000,000}{16,000,000} = 1.3 \text{ lb. per square foot.}$$

In the case of an 18-in. diameter fan, which presents an area of 2.54 sq. ft.,

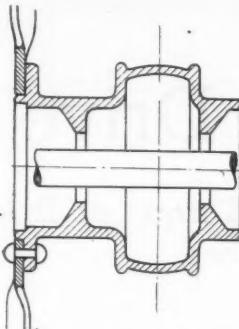
$$1.3 \times 2.54 = 3.3 \text{ lb.}$$

is the total pressure of the air column, or the total thrust load.

Affected by Initial Air Velocity

The end thrust also depends on the initial air velocity produced by the motion of fast-moving road vehicles. This air velocity will naturally tend to drive the fan and will reduce end thrust. At a certain speed the initial air velocity is equal to the one due to the fan, and the thrust loads will be balanced. At speeds above this the thrust will be reversed. This would indicate that on passenger cars there is the least necessity for provisions to take up thrust loads.

The foregoing shows that the radial load is the one that has to be taken care of in cooling fans, and that the thrust load is so small that it does not justify using a combination bearing. The small amount of thrust load is best taken care of by a plain thrust bearing, using a floating bronze washer between two hardened and ground steel surfaces. There is not sufficient pressure to squeeze the oil film out between the washers and the thrust will be carried on an oil film. This arrangement is simple and does not call for means of adjustment or extremely accurate machine work like ball thrust arrangements. The latter also do not stand any abuse or hard handling through the shops and in service, and require expert and careful assembling. Fan mountings equipped with flex-



Fan hub design which is wrong because it requires constant replenishing of the lubricant supply

ible roller and plain thrust bearings have been tested recently in a laboratory to the equivalent of 100,000 miles of automobile service without detrimental depreciation or failure of the thrust washers.

Cup and Cone Bearings

Cup and cone ball bearings have been widely used up to date, but their basic principles are wrong for most of our fan applications. It takes an expert to know when these bearings are properly adjusted, and when not in proper relation to each other they are noisy and deteriorate rapidly. If the bearings are too tight, undue strain is put on the already severely taxed surfaces, with the result that their life is materially shortened. A certain blow or shock at such a time causes indentation of the races and is apt to cause breakage. The slightest wear interferes with the proper action of the cup and cone bearing. Carrying a thrust load in addition to the radial load results in a considerable reduction of the radial load carrying capacity, which is the main load to be taken care of in cooling fans. The best practice is to let the bearings do one thing and do it well, rather than do two things indifferently. With bearings designed to carry one load only, we have none of these complications, hence their design and mounting conditions are simple. This includes annular ball, roller and plain bearings. If such bearings are properly built they will operate indefinitely. Their advantages for this kind of service are many and very quickly seen. If at any time the housing or mounting in which such bearings are operated is taken apart for any purpose, any novice can put it back again without any danger of mistake, for there is no adjustment involved.

These bearings, it will thus be seen, cannot be adjusted too loosely, causing noise and poor alignment. Neither can they be adjusted too tightly, which would increase the strain on the operating surfaces, and which might even cause breakage in the case of excessive shock.

Hub Design

As none but fluid lubricant should be used for fans, the hub should be designed so that the oil will reach the bearings and not be held by circumferential force against the pulley rim. The bearings therefore should be the largest diameter in the inside of the hub. Designs like that illustrated by the sketch are wrong, as they require constant replenishing of the lubricant. The bearings would run dry even with the hub nearly half full of oil. Provision should be made to keep the dust out and the oil in. This can be done in a simple way by making the center of the fan blade spider solid, bolting it to the front flange of the hub and inserting into the rear a suitable felt retainer. Adjustable stuffing boxes have not proven successful. They are either too tight or too loose, as no care will be given them. When tight, they cause slippage of the belt and deterioration of same, excessive heating of the hub and spindle, scoring of the shaft and destruction of the felt; when loose and not properly locked they cause oil leakage and are being shaken off by the fan vibration. The fan shaft should be made of high-grade material and heat treated to obtain a high resistance against fatigue. The fan supports must be rigid, and rather too heavy than too light, to prevent vibration and breakage. Account should be taken of the fact that in most cases such breakage causes destruction of the radiator and necessitates expensive repairs.

Summarizing the foregoing, it has been shown that the fan is the most potent cooling factor, and the essential features of its design and operation are:

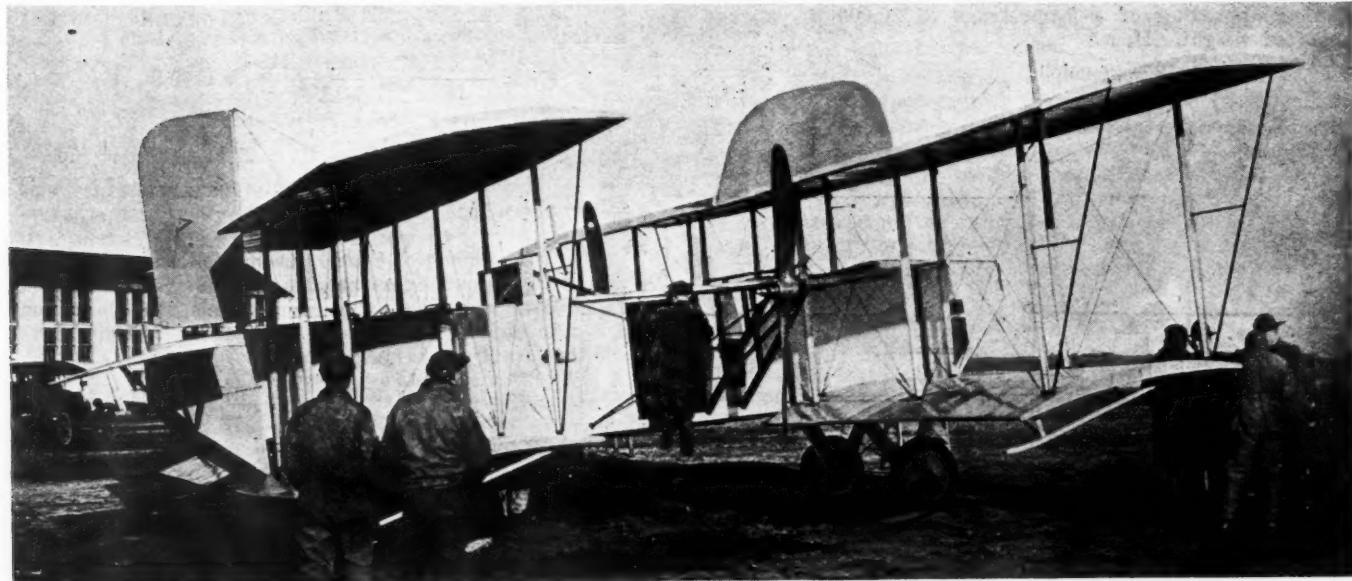
LARGE DIAMETER AND LOW SPEED.

PROPER DESIGN OF BLADES FOR MAXIMUM AIR EFFICIENCY WITH A MINIMUM HORSE-POWER.

WIDE BELT AND LARGE DIAMETER PULLEY.

RADIAL BEARINGS, OIL AND DUST TIGHT.

A SUITABLE FAN HOUSING ON SLOW-MOVING AUTOMOTIVE ROAD VEHICLES.



This new tandem plane recently made its initial flight at Mineola, Long Island. It is one of the regular twin-engine pusher machines, and has an additional set of wings attached to the fuselage

An Analysis of the Hotchkiss Drive*

Loads on Rear Springs the Resultant of Weight Carried and Torque or Brake Reaction—Spring Action Under Road Shock Reduced
by Effect of Torque on Spring

By Otto M. Burkhardt

THE reaction of the torque transmitted to the driving wheels of a motor vehicle has a tendency to lift the front wheels off the ground. The torque necessary to raise the front wheels is

$$T \times R = W_f \times b$$

where

T = Ttractive force at circumference of driving wheels in lb.

R = Radius of driving wheels in in.

W_f = Load on front wheels in lb.

b = Length of wheel base in in.

From the above equation we find that the force tending to lift the front wheels off the ground if a certain torque $T \times R$ is transmitted to the rear wheels may be expressed by

$$W_f = \frac{T \times R}{b}$$

Let W be the weight of a motor truck when loaded. The weights on the rear and front wheels then will be about $\frac{3}{4} W$ and $\frac{1}{4} W$ respectively. The tractive force of heavy commercial vehicles is generally smaller than $0.6 \times W_f$, but for passenger cars it is frequently larger. We may, therefore, take this as a practical average value. For a wheelbase of 8.4 times the radius of the driving wheels, we find that under the above given circumstances the force tending to lift the front wheels off the ground is:

$$W_f = \frac{T \times R}{b} = \frac{0.6 \times W_f}{8.4} = 0.0536 W.$$

The latter amount is equal to 21½ per cent of the weight on the front wheels. As this phenomenon lends itself admirably for the determination of the tractive force, it was utilized in some well known experiments by Professor Riedler.

We may now with advantage apply our equations to a practical example, that of a 5-ton truck of 20,000 lb. spring-supported weight. Hence

$$W = 20,000 \text{ lb.}$$

*From a paper presented to the Buffalo Section of the S. A. E.

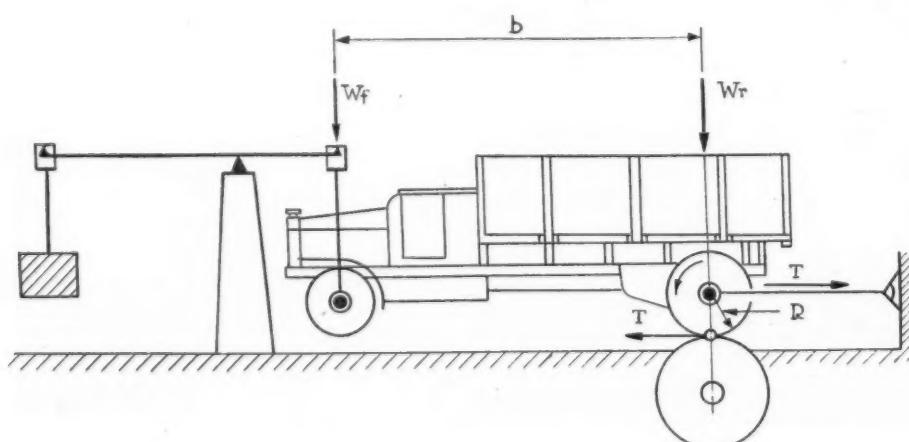


Fig. 1—Showing tendency of forward end of truck to lift

$$W_r = \frac{3}{4} W = 15,000 \text{ lb.}$$

$$W_f = \frac{W}{4} = 5000 \text{ lb.}$$

The truck is equipped with an engine developing 50 hp. at 1000 r.p.m. The total gear reduction is 50 to 1 in low gear, and the efficiency of the mechanism may be taken as 80 per cent. We obtain, therefore, a driving power reaction moment of

$$T \times R = \frac{50 \times 63024}{1000} \times 50 \times .8 = 126,000 \text{ lb.-in.}$$

With a 14 ft. = 168 in. wheelbase the force tending to raise the front axle is:

$$W_f' = \frac{126,000}{168} = 750 \text{ lb.}$$

The chassis shown in figure 2 is provided with a torque rod, which is provided to impart the wheel power reaction to the frame. As the torque rod is 50 in. long the pressure exerted at the end of the rod is

$$P' = \frac{126,000}{50} = 2520 \text{ lb.}$$

This pressure is comparatively small and easily taken care of.

As a single force cannot balance a couple, we must have another force equal and opposite to P' with its point of application in the center of the axle. The latter force, being the reaction of the former, has been denoted with P'' . We shall now resolve the force P' into two components P'_f and P'_r with their points of application at the centers of the front and rear axles respectively. The former of the two components is what we have so far known as W_f' as we shall presently see. It is:

$$P'_f = \frac{P' \times 50}{168} = \frac{2520 \times 50}{168} = 750 \text{ lb.} = W_f'$$

$$P'_r = \frac{P' \times 118}{168} = \frac{2520 \times 118}{168} = 1770 \text{ lb.}$$

If we now subtract P'_r from P'' we obtain

$$P'' - P'_r = 2520 - 1770 = 750.$$

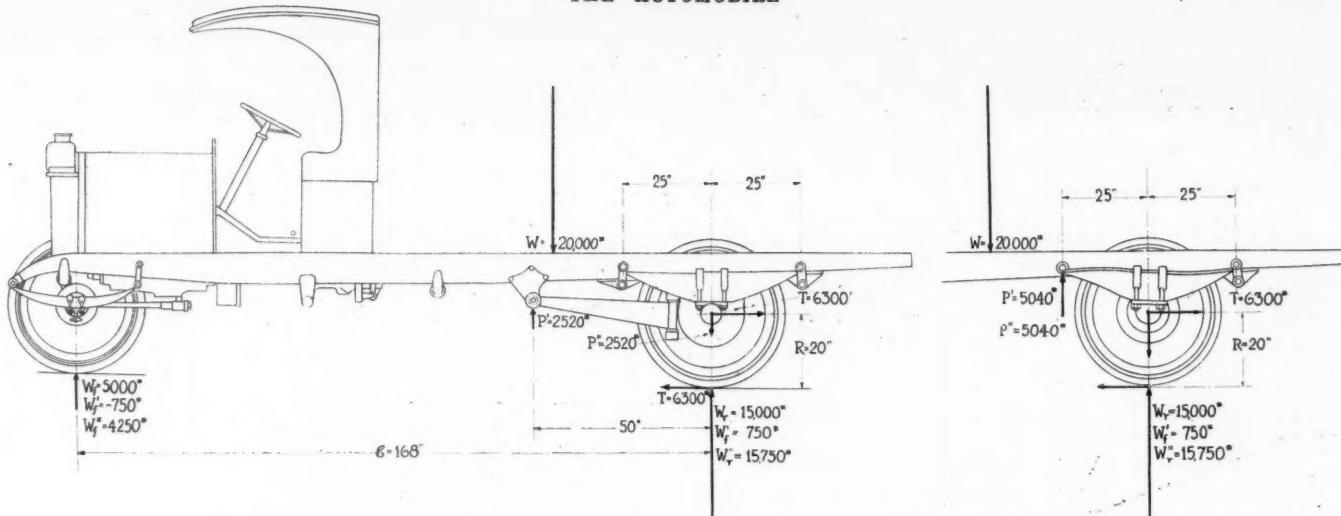
The force $P'' - P'_r$ is, therefore, also equal to W_f' , but acting in the opposite direction.

From this it follows that when the maximum torque is transmitted to the rear wheels, the loads on the rear and front wheels have changed to

$$W''_r = W_r + W_f' = 15,750 \text{ lb. and}$$

$$W''_f = W_f - W_f' = 4250 \text{ lb.}$$

Let us now take another torque rod of the same length as the one considered but extending from the rear axle equal distances in both directions and having both ends linked to the frame. The pressure on both ends of the torque rod will then be alike, i. e., 2520 lb. If, how-



Figs. 2 and 3—Loads and reactions with ordinary and Hotchkiss drive trucks

ever, we substitute a rear spring for the torque rod all conditions are changed.

To prove our contention a chassis is shown in Fig. 3 in which the springs act as torque rods. With the same power and gear ratio we obtain the same loads as before on rear and front wheels,

$$W''_r = W_r + W'_f = 15,750 \text{ lb.}$$

$$W''_f = W_f - W'_f = 4250 \text{ lb.}$$

Now the whole system is in balance. The springs are centrally secured to the axle and each rear spring bolt must necessarily carry a load of

$$\frac{15,750}{4} = 3938 \text{ lb.}$$

The torque reaction is to be imparted to the chassis through the rear springs. As the springs are designed to take loads in one direction only it must be taken for granted that the two rear spring halves to the left of the axle center have to withstand the reaction of 126,000 lb.-in. If we assume the rear springs to be 50 in. long we have two half springs each 25 in. long to take this reaction. This means an extra load of

$$P' = \frac{126,000}{2 \times 25} = 2520 \text{ lb.}$$

on each of these spring bolts. It is absurd to think that the right hand halves of the rear springs could take part of this load because this would require a downward pull, whereas it is quite evident that the spring halves here under consideration cannot pull in one direction and at the same time push in opposite direction to support half of the load which is carried by either rear wheel.

In the chassis shown in Fig. 3, we have, therefore, one half of the rear spring loaded as before with

$$\frac{W''_r}{4} = \frac{15,750}{4} = 3938 \text{ lb.}$$

while the other half is loaded with $3938 + 2520 = 6458$ lb.

Every motor truck is provided with brakes. If they are in good condition and applied with some force it is generally possible to lock the rear wheels. This produces a moment of about

$$15,000 \times 0.6 \times 20 = 180,000 \text{ lb.-in.}$$

This braking power acts in a direction opposite to the driving power and its reaction also is opposite in direction to the driving torque reaction. That is, in the case of the Hotchkiss drive, Fig. 3, the rear instead of the front halves of the rear springs transmit the reaction to the chassis. We observe that the braking power is 43 per cent larger than the driving power. In determining this figure the load of which the rear wheels are relieved when the brakes are applied has been neglected because if chains are used the braking power may even be larger than here assumed.

Now in case of the chassis shown in Fig. 2 the rear springs are loaded less than ordinarily when the brakes are applied. However, in the chassis of Fig. 3 the load on the rear halves of the rear springs is much increased by the application of the brakes. Following the same reasoning as before we have:

$$W'_f = \frac{180,000}{168} = 1070 \text{ lb. and consequently}$$

$$W''_r = W_r - W'_f = 15,000 - 1070 = 13,930 \text{ lb.}$$

$$W''_f = W_f + W'_f = 5000 + 1070 = 6070 \text{ lb.}$$

Each of the rear halves of the rear springs receives an additional load

$$P' = \frac{180,000}{2 \times 25} = 3600 \text{ lb.}$$

These half springs are, therefore, loaded with $\frac{13,930}{4} + 3600 = 7083$ lb.

The minimum load ever carried by the rear wheels of either chassis may be taken as 6600 lb. (Vehicles running without load.) The minimum load per spring bolt is, therefore,

$$\frac{6600}{4} = 1650 \text{ lb.}$$

If the springs for both chassis are designed to deflect 4 in. under the maximum load, then if the vehicles are running with very little load the spring deflection in case of the chassis shown in Fig. 2 is

$$d_2 = 4 \times \frac{1650}{3938} = 1.675$$

while in the case of the chassis shown in Fig. 3 the least deflection is

$$d_3 = 4 \times \frac{1650}{7083} = .932.$$

The difference in the riding qualities of the two vehicles is, on this account, quite considerable. In fact, the latter vehicle if badly designed, may be entirely unsuitable for the transportation of light delicate goods.

Fig. 3 illustrates how unequally the springs deflect. This accounts for the well-known phenomenon that in most Hotchkiss drive trucks the brakes hold all right if applied gently but not if applied vigorously, or vice-versa. The trouble of loose spring clips so closely associated with the Hotchkiss drive is also well known. Furthermore, it is well known that the speed of the vehicle is dependent upon the suspension. A vehicle equipped with torque rod may, therefore, safely be operated at somewhat higher speed than one without this member.

So far, we have assumed that the reaction of the tractive force is a constant draw bar pull acting in the center of the rear axle. In practice the tractive force is generally utilized to accelerate the gross weight of the vehicle, to overcome road resistance or resistance due to gradients. During acceleration the reaction of the tractive force has its point of application in the center of gravity of the vehicle. When gradients are negotiated at a constant rate of speed or under other constant running conditions the reaction has its point of application in the front end of the radius rods if such are provided or in the front spring bolts in case of the Hotchkiss drive arrangement.

Now every engineer knows that the center of gravity of

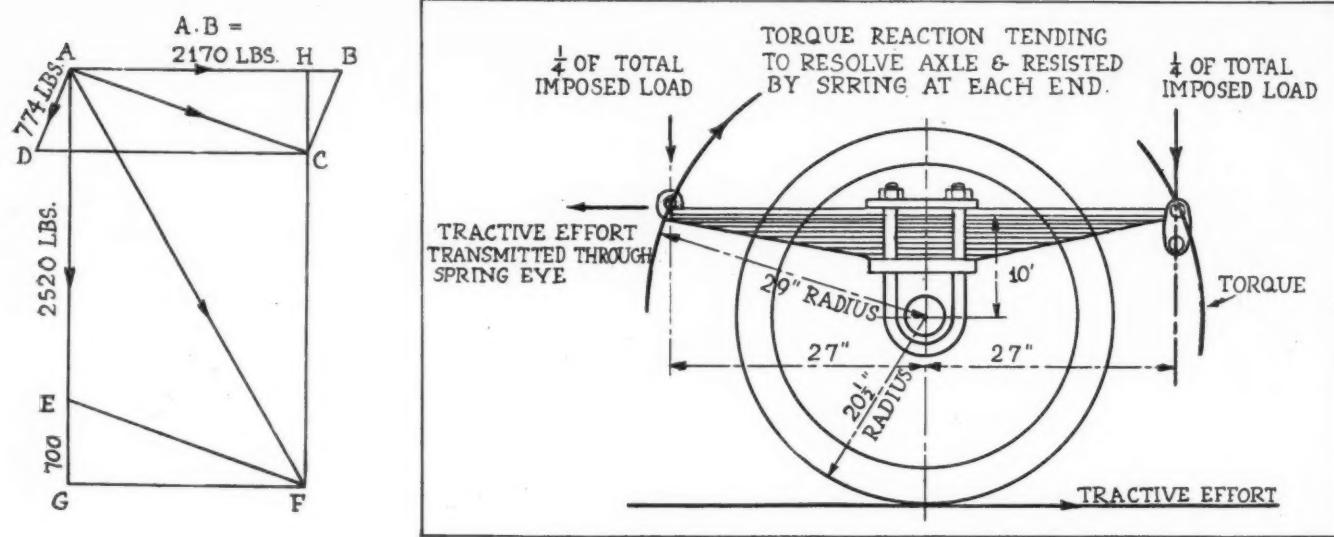


Fig. 4—Drawing revealing a misconception of the action of a Hotchkiss drive

a motor vehicle as well as the other points of reaction above mentioned are generally further from the ground than the center of the rear axle. Consequently in these cases we have to deal with a moment of much larger magnitude than those so far considered.

That such fundamental principles are being neglected is shown by Figs. 4 and 5, which are reproduced from leading trade papers. In connection with Fig. 4 the writer states that the torque reaction is resisted by the spring at each end. This we have proved to be an erroneous conception. Furthermore, we learn from the magnitude of the forces that the writer imagines the reaction of the tractive force to be acting in the center of the axle, whereas in reality it is acting through the top leaf of the spring. The writer shows it there but neglects it. This makes it appear advisable to place the spring way above the axle. Hardly anybody, and least of all the advocates of underslung spring design, can reconcile themselves with such a conclusion. This, however, is no rea-

son and another hypothesis should be invented, because in an exact science like mathematics and mechanics there is no need for hypotheses. Nevertheless, we find in another article by a well known company that in its opinion a load acting vertically in the center of a perfectly symmetric spring can impose unequal loads on the spring bolts. Fig. 5 is reproduced from this article and speaks for itself, for it is all fiction, with not a bit of truth in it.

Spark Plug Manufacture in Great Britain

PREVIOUS to the war the production of spark plugs in Great Britain was insignificant. There were three firms manufacturing, and their total output for all purposes during 1914 was not more than 5000. To-day five firms in the country are producing mica plugs, and their output for the year ending October 31 last was 2,148,726. The October output was 303,449, as compared with a monthly output of 420 in 1914.

It is admitted, however, that there is room for further improvement of the mica plug for aircraft engines.

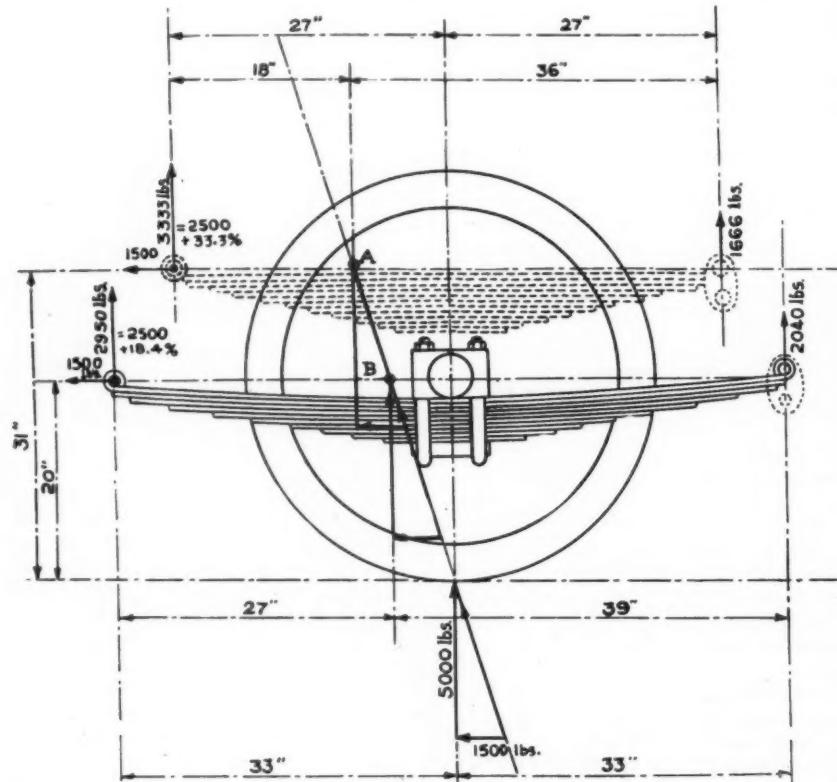


Fig. 5—An incorrect load diagram

Acier/Aluminum Alloy Pistons

A NEW aluminum alloy which lends itself well to the production of sand-cast pistons is being marketed by the Acieral Company of America, New York City. The alloy is furnished in sand castings, rods and sheets. It does not contain any zinc, or magnesium, and is claimed to have a high tensile strength, the guaranteed minimum being 20,000 lb. per sq. in. Other physical properties of the alloy are as follows: Elongation, 2.5 per cent; Brinell hardness, 60; fusion temperature, 1380 deg. Fahr.; coefficient of heat expansion, about 50 per cent greater than that of cast iron.

We are informed that the Acieral alloy is the result of experimental and research work in France and the United States. Since there is no zinc in Acieral alloy, it is less given to crystallization than other aluminum alloys. The outstanding physical properties of Acieral are its compactness and homogeneity. The castings machine easily and take a very high polish. The specific gravity of the alloy is only 2.86, which is less than that of pure aluminum. All of the general advantages of aluminum pistons, such as light weight, high heat conductivity, etc., apply also to this alloy.

How Valuable Are Profit-Sharing Plans?

1—To the Employee 2—To the Employer

Any System Which Attempts to Satisfy the Physical Necessities of the Worker Without Increasing His Responsibility Must Fail

By Harry Tipper

THE changes in business organization in manufacturing establishments which have been made in the past few years, in the attempt to provide a common method of expressing the common desires and purposes of the human beings composing the organization, range all the way from complete "republics" to shop committees and boards of appeal indefinitely organized and with no authority. They represent, in fact, all stages of development, from the informal getting-together of supervisors and subordinates for a particular occasion to a thoroughly worked-out system by which the group of workers can be bound closely together for the purposes of production and distribution. While this variety is exhibited in the actual developments of such organizations, the same purpose runs through them all—the idea of getting-together so their grievances may be aired, adjustments made and a common responsibility understood.

Profit-sharing systems have been tried over a much wider field and to a much greater extent than systems of organization for these purposes. Because the wage system is the point of attack in almost all cases, and serves as the text for the actual expression of all forms of discontent, it has been the most usual point of consideration in the endeavors of manufacturers to remove the discontent. In fact, it is evident that for one manufacturer who has dipped deep enough into the causes of discontent to see the necessity for the creation of an organization to undertake their adjustment, fifty manufacturers have observed the fundamental failure of the wage system to satisfy the demand of the workers and have instituted some form of additional remuneration to adjust matters in this respect, which form amounts to profit-sharing to some extent.

Various Forms of Profit-Sharing

But there is a wide difference between these methods of wage adjustment and the organization attempts which have been considered in the earlier articles, in that while organization attempts are all based upon the fundamental principle of getting together and establishing a common responsibility, these attempts at profit-sharing run all the way from a mere arbitrary bonus upon wages given as a reward for production to a full-fledged system of sharing the profits of the organizations among capital, government and governed in the manufacturing establishment.

The numerous forms of profit-sharing which have been established to meet certain immediate necessities are not sufficiently important and do not depart sufficiently from general practice to be worth considering in this connection. Bonus systems for production, stock-sharing systems and time-study systems, where the payment is made for the different requirements of a task, are all valuable as far as they go, but they secure their principal value from the comparison with other establishments in which these systems are not in vogue. The common adoption

of such systems would mean their elimination as a means of satisfying the worker and removing the causes of discontent or accelerating their adjustment.

This same thing of course is true in a very much greater degree of systems of high minimum wages with purely paternalistic interest in the worker's welfare, along the lines developed by the Ford company and others. Their present value is undoubtedly as a means of retaining the best class of skilled workers and of securing a flow of the most efficient skilled workers to replace those that naturally drop out. Such systems undoubtedly reduce the turnover and increase the productive efficiency so long as they represent a departure from the usual practice and have not been commonly adopted. They do not in themselves provide incentive and they are far removed from giving the worker any share in the responsibility for production or any partnership in the responsibility of the organization, and they must inevitably fail whenever the competitive advantage they offer is eliminated by the common adoption of similar systems in a general way. It makes no difference to what extent such systems may appear to remove the causes of discontent, temporarily to reduce the labor turnover and to eliminate strikes for a given period of time.

Must Consider Employee's Responsibility

Any system which attempts to satisfy the physical necessities of the worker or his present physical ambitions without increasing his responsibility in connection with the conditions of his own work in the organization unit of which he is a part is bound to fail ultimately because group organizations of human beings are held together by the common necessity and the common responsibility shared by all members of the group.

In the profit-sharing systems which have come to the writer's attention there are one or two based so evidently upon the responsibility of the various individuals of a group to the group necessities and upon unusual recognition of the value of a permanent working force that some examination of their condition is of interest as indicating the departure which has been made by individual concerns from the usual practice and the lengths to which individual manufacturers have gone in their endeavor to solve this labor question.

Had the following system emanated from a professional Socialist it would have been decried as Bolshevism, but it was established by a successful and hard-headed manufacturer who employs a force of 250 people, most of whom are not organized, and therefore could not at any one time develop much strength in a strike or materially embarrass his production.

The system is based upon three cardinal points:

1. The allowance of 6 per cent on the invested capital as a part of the expense of the business.
2. The provision of a living wage to all employees, from the president to the night watchman, this living

wage being based upon the general cost of living in the social surroundings which must govern to some extent their cost.

3. The division of gross profits equally between the invested capital and the workers in the business, including in the workers all who spend their time in the active organization of the business, from the president down. The details of this organization represent many further interesting facts. The one-half of the surplus of gross profit which is the share of the workers is divided as follows: One-third to the selling force, one-third to the executive department and offices, and one-third to the factory.

All Are Included

In each case this division includes supervisors and supervised alike. There is no distinction between the man who is spending his life governing a department of the business and the man who is spending his life working under that supervisor.

The amount paid out of the fund created by the allotment of this share of the profits for the worker is divided according to the salary which has been designated to each worker under the living wage clause. The wages themselves are adjusted periodically according to necessity, but they are adjusted only from top to bottom when any adjustment takes place. In other words, there is no adjustment of one worker or one department of workers because of a market necessity, so that there can be no discontent arising from an adjustment of wages which must be made.

The payment of the fund which is set aside for the active workers in the establishment has been the one point which has created considerable discussion and which has led to different methods in the three or four organizations which have established practically this system of operation.

In one instance the conditions are laid down by the officers of the company and no worker can secure his share of the fund except under those conditions. In the meantime the fund is deposited for them with the concern as trustee. In this concern the office staff, the selling force and the supervisors are paid their share annually in a lump sum, but the workers in the factory can only draw their money out under the following conditions:

First, leaving the employ of the company.

Second, buying a home.

Third, buying insurance.

Fourth, in emergency, to be determined only by the president of the company. The reasons for this are obvious. It is the desire of the company of course to protect a man against his own weakness to some degree, and it was found when this system was put into operation that some of the workers had spent all their money in a few days upon speculative investments and extended vacation from the work, a period of dissipation, and in other ways lost the value of their year's endeavors.

Profits Distribution Left to Committee

In another organization in which the same problem came up the conditions under which a man could draw the money accruing to him as his share in the profits were left to the determination of the committee of workers drawn by election from every department of the company.

In all these cases the living wage is placed at such a figure that it will pay all ordinary expenses, including the usual medical attendance, the education of children, etc., so that the share in the profits is expected to provide a fund for emergency and for old age.

The weakness of the first attempts in this scheme of

profit-sharing was the placing of the fund at the disposition of the company itself, and to this is due some suspicion which has attached to it in the minds of some workers who have been familiar with the system. This difficulty has been eliminated in the later development by placing the control of the fund in charge of a committee of workers, so that it is not decided by the company, which might be suspected of deciding as to its disposition from the interests of the company itself.

There are two other out-croppings which come in as a necessary corollary to the adoption of this system which are in themselves of greater interest and perhaps have as much to do with the success of the system as the actual character of the profit sharing. The most important of these is the necessity for a statement to the employees as to the amount of business done, the cost of doing business, the profit, etc., so that the employees may know what their share will be. Without this of course the system would not remove the old suspicion that the scheme was a scheme to get a lot more work without giving a proportionate share of the increase to the worker. Books might be juggled, statements might be made which were not correct, and expenses introduced so that the result would be that at the end of the year only a small fund was available for distribution.

Keeping the Workers Posted

To clear away any possible misunderstanding in this direction and to give the workers an opportunity to see what the business is doing, a committee of workers, one from each of the different departments, meets once a month and gets up a statement of the condition of the business, being supplied with the information for that purpose from the company's books. Inasmuch as this committee takes in a man from each department, including the auditor's department and the purchasing department, it is obvious that the net result is complete publicity to the workers on the actual profits made.

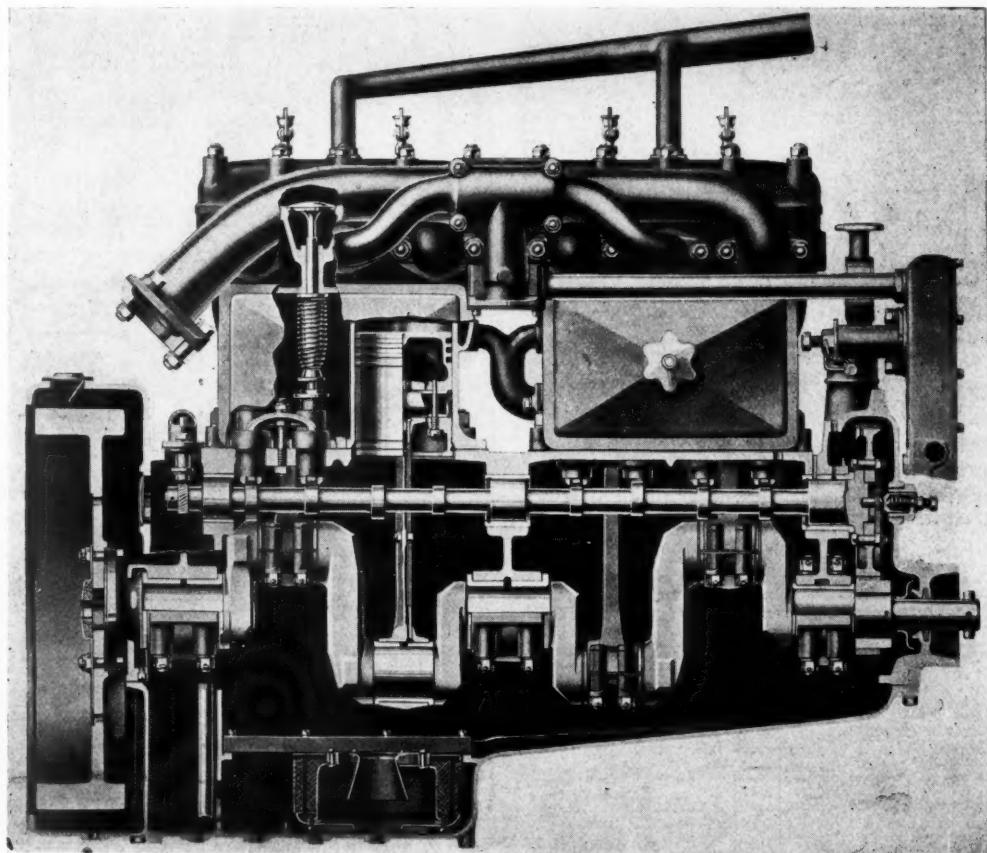
The benefits of this item extend far beyond the confines of the profit-sharing system out of which it grew. The real reason why there is so consistent a demand on the part of the workers for a larger share in the rewards of business without regard to the effect of such demands is the ignorance of the worker as to the percentage which becomes profit and the relation which his wages bear to the cost of doing business. Every worker in this establishment sees the statements simplified so that he can understand them as to the cost of material, cost of labor, cost of all items entering into the total expense of the business, and he has an opportunity to realize the insignificance of the share which capital is securing out of the business as an investment.

Has Stabilized Working Force

The system has been a success in the small establishments in which it has been tried. It has stabilized the working force so that the turnover of labor is very small. It has made each man an inspector, interested in the quality and speed of his output and of the output of the other workers. It has made each man take an interest in the maintenance of quality and accuracy all through the plant, because every worker receives a portion of his material advantage from the way in which the product is received on the market, from the price it secures, and from the contentment of the customer. It has developed an interest all through the organization in the necessity for pleasing the customer in every way, and it has resulted in the payment of a large amount above the 6 per cent allotted to the stockholders, so that the invested capital has not suffered by the development, but has apparently increased its earnings by this method.

Continental Adaptation of Class B War Truck Engine

Designed for Military Use, It Will Now Be Manufactured for Tractors and Heavy Commercial Cars—Aluminum Crankcase and Bell-Housing a Feature



Partial section through Continental B2 truck and tractor engine

THE Continental Motors Corp. has adapted the Class B war truck engine to commercial usage and is now on the market with its Model B2, which in all essential qualities corresponds to the Class B truck engine, being manufactured under the same rigid inspection rules, of the same material and to the same dimensions as this engine which was very successful in Government service. As this engine was designed with little regard to cost, to meet a high standard of performance and endurance, it is not by any means a low-priced engine, but on the other hand one which may be expected to give a good return in service in the tractor and heavy truck fields for which it is being manufactured.

The four cylinders are cast in pairs with detachable heads and mounted on an aluminum crankcase with a removable aluminum pan. The cylinders are L-head, with inclosed valve mechanism, and the engine is furnished in unit powerplant type adapted for three-point suspension.

The performance, as taken from a block test, is shown

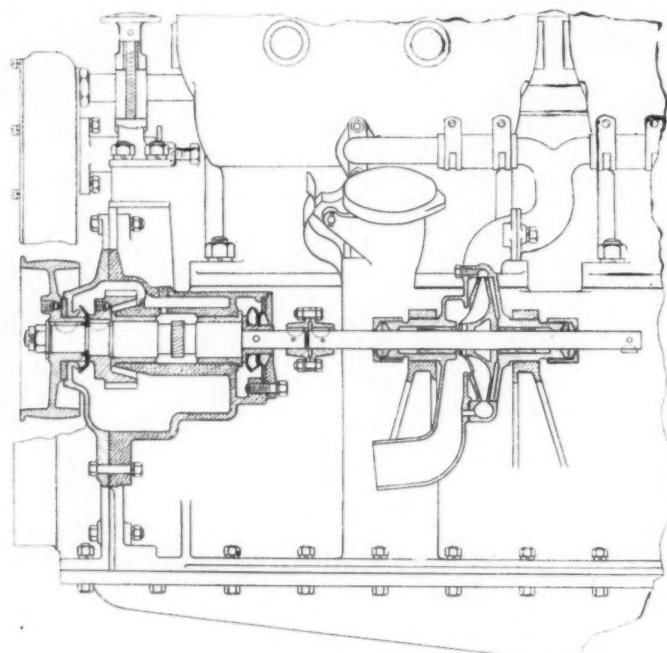
by the accompanying chart upon which are plotted curves of torque, mechanical efficiency, indicated horsepower, brake horsepower, thermal efficiency, fuel consumption and frictional horsepower. The cylinder dimensions are $4\frac{3}{4}$ in. by 6 in., or 120.7 by 152.4 mm.

The engine is strictly a heavy-duty type, having a piston displacement of 106 cu. in. per cylinder and 424 cu. in. for all four cylinders, with a clearance ratio of 25.3 per cent, giving a normal compression of 60 lb. The firing order is 1-3-4-2. The valves are on the right side of the engine, the head diameter being $2\frac{3}{8}$ in. and the diameter of the opening, $2\frac{1}{8}$ in. The seat angle is 45 deg. and the lift of both the inlet and the exhaust valve is $11/32$ in. The manifolds are on the right side and assembled in a unit to give an exhaust heated intake. The engine is designed to take the standard No. 1 S. A. E. bell housing flange and the standard type of multiple disk clutch. The standard flywheel is $19\frac{1}{8}$ in. outside diameter and weighs 126 lb.

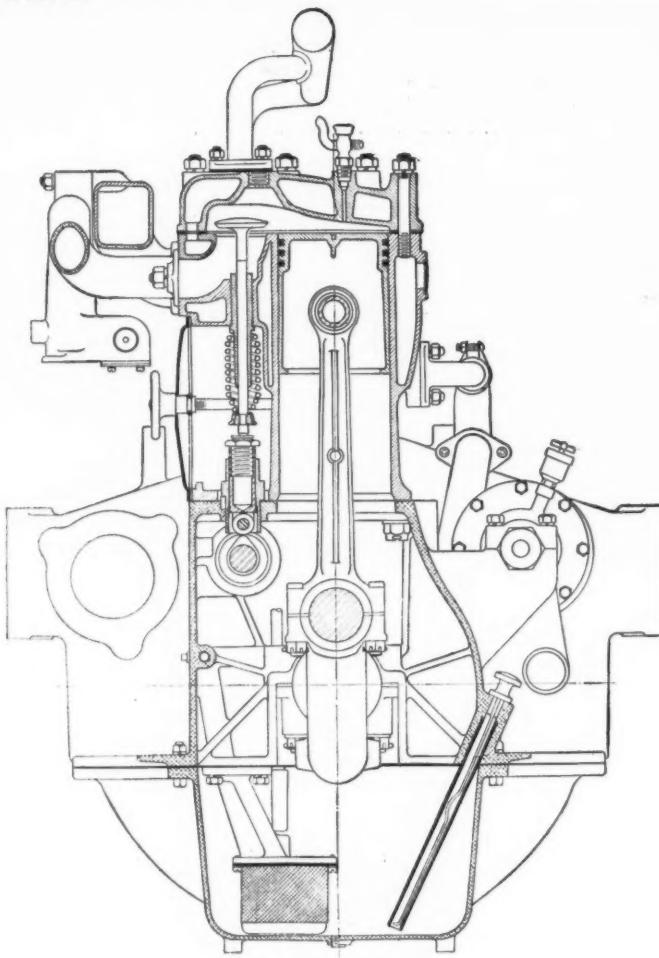
The entire design is suitable for tractor use, in that

there has been no sparing of material where rigidity is required. The crankshaft is $2\frac{1}{2}$ in. in diameter and is carried in three bearings. The camshaft is $1\frac{1}{4}$ in. in diameter and is also carried in three bearings. The crankshaft bearings are of the following dimensions (front to rear): $2\frac{3}{8}$ by 3 in., $2\frac{1}{2}$ by 4 in. and $2\frac{1}{2}$ by 4 in. The camshaft bearings are: $2\frac{1}{4}$ by $2\frac{1}{8}$ in., $2\frac{1}{8}$ by $1\frac{1}{4}$ in. and 2 by $1\frac{3}{8}$ in.

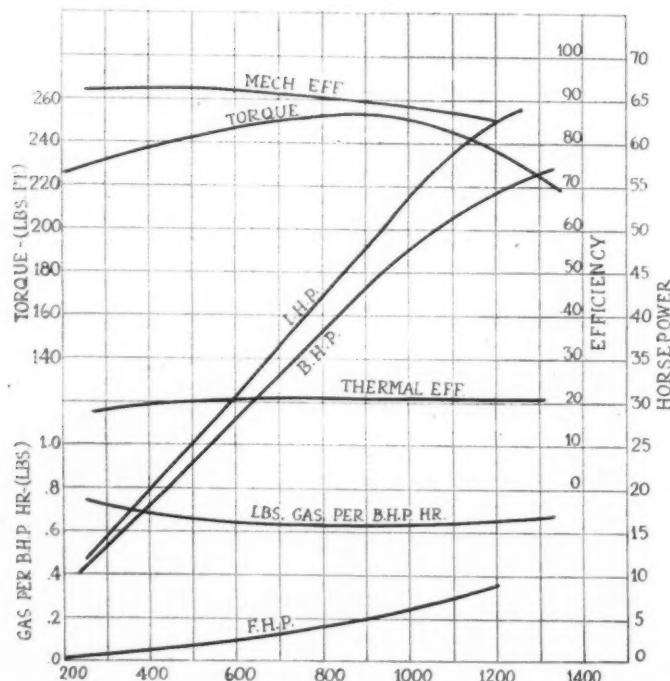
The cooling system is designed to be ample under the most adverse conditions of load and temperature, the water being circulated by a centrifugal pump located on the left side of the crankcase between two cylinder blocks. The water inlet elbow is cast iron, being integral with the pump, with rubber connections to each of the cylinder block intake headers. The water outlet pipe is of brass



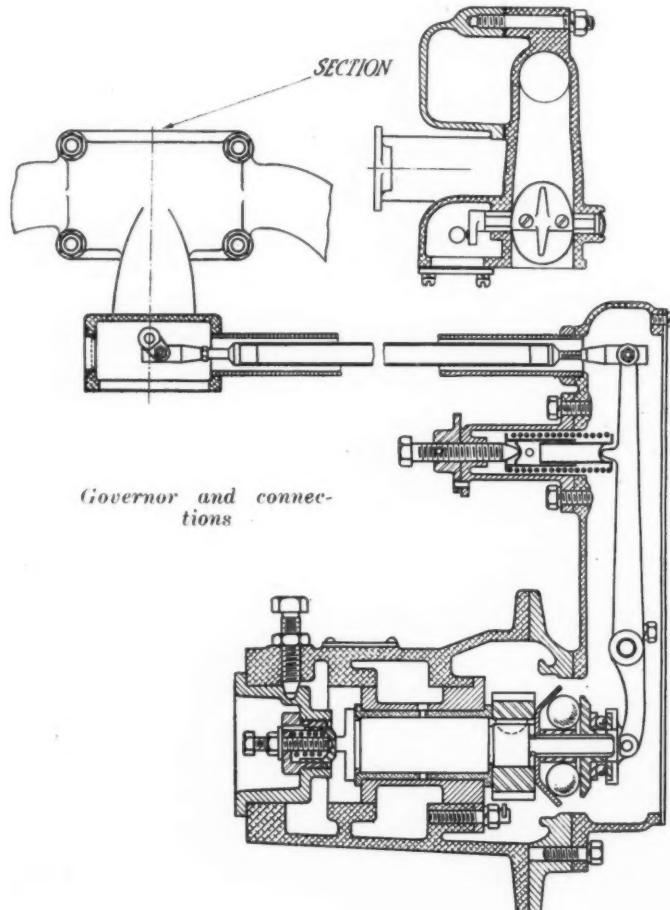
Pump and fan belt drive

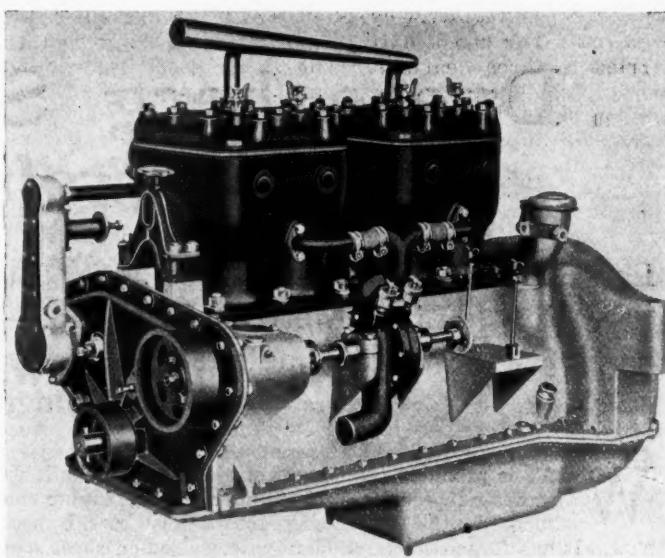
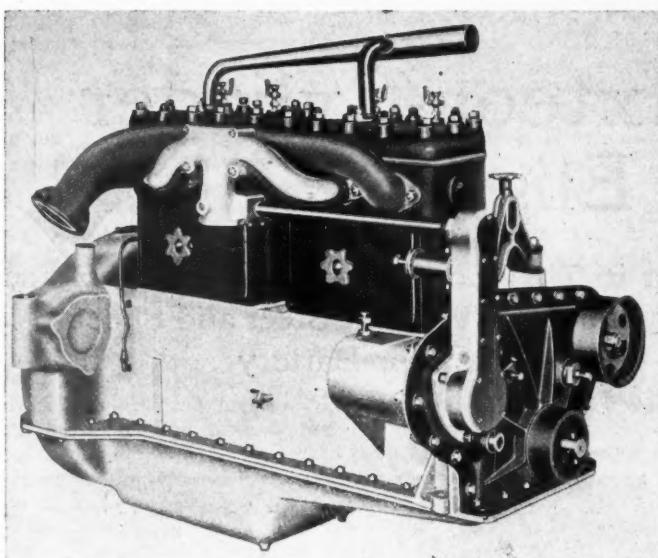


Cross section of engine



Power, mechanical efficiency and fuel consumption curves





Right side—Continental B2 truck and tractor engine—Left side

tubing and is a separate unit, tapered throughout its length. The water pump shaft rotates at crankshaft speed in a clockwise direction, looking at the front end of the engine. The fan is 20 in. in diameter and is driven by a flat belt, 2 in. in width, the drive pulley being $6\frac{3}{8}$ in. and the driven pulley $3\frac{1}{4}$ in. in diameter.

A complete pressure feed is used for oiling, the oil pump being of the gear type and forcing oil to all bearings of the crankshaft, connecting-rods, camshaft, piston pins and gearcase. Splash is used for the cylinder walls.

The magneto is mounted on the left side and is driven off the water pump shaft. The carbureter fitting is for a vertical type, $1\frac{1}{2}$ in. standard S. A. E. flange. Special provision is made in the gearcase for a distributor to

be driven from the pump drive shaft. Spiral gear drive is used for the vertical shaft.

The governor is fitted and mounted on the gearcase cover and driven from the generator drive shaft. It controls the butterfly valve by means of a horizontal rod leading back to the intake passage. Provision is made also for a lighting generator to be secured to the right side of the engine looking at the flywheel end. This is driven by an independent shaft. The starting motor also mounts on the right side of the engine and attaches to pads cast on the side of the crankcase and to the boss on the flywheel housing. The starting motor drives through the teeth on the flywheel, connection being established by means of a Bendix shift.

Titan Pneumatic Hammer

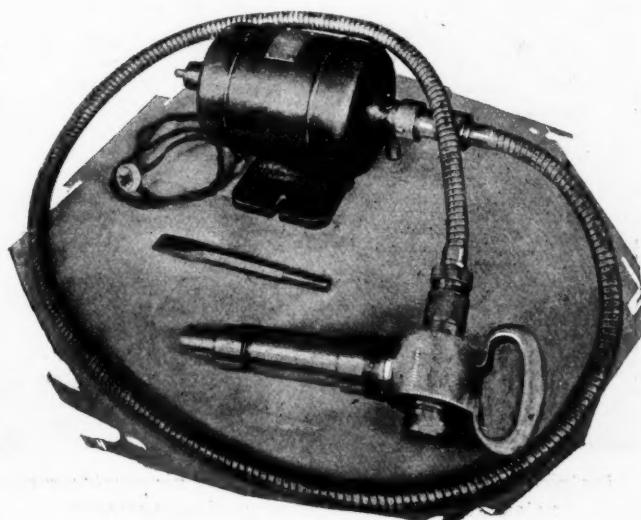
A NEW form of power hammer has been placed on the market by the Titan Automatic Tool Company, New York. The motive power is derived from an individual electric motor and is transmitted to the tool pneumatically, but the air is used in the hammer at atmospheric pressure only. The hammer outfit comprises three elements, viz., the hammer proper, the electric motor and a flexible shaft. The motor and shaft are standard construction and do not need to be described here. The motor is of from $1/10$ to $1/3$ hp., depending upon the size of the hammer used, and is of the shunt wound type. The length of the flexible shaft will vary in accordance with the work for which the hammer is to be used.

Within the body of the hammer is a chamber at one end of which is the tool holder and at the other end of which is a plunger which is reciprocated by the motor through the intermediary of the flexible shaft. Within the hammer is a freely slideable projectile which is hurled against the tool holder at the rate of 2000 times a minute, by the reciprocating plunger, whereby the hammering action is obtained. There are two openings or ports in the chamber, through which it communicates with the atmosphere when the hammer is not working. One of these ports, the lower one, is between the tool holder and the sliding projectile, and is never closed. The other port is between the plunger and the sliding projectile and is closed by the operator when the hammer is to be started operating.

Suppose the plunger to be rapidly reciprocated by the motor, the second port being open; the hammer then will not work because the pressures at both ends of the projectile are equal (atmospheric). Now suppose the second opening to be closed; then that portion of the chamber between the plunger and the projectile is no longer open to the atmosphere, and the travel of the plunger will reduce the pressure within

the chamber. The sliding projectile will now follow up the plunger, owing to the fact that air under atmospheric pressure acts on the lower end of the projectile, the lower end of the chamber being always open.

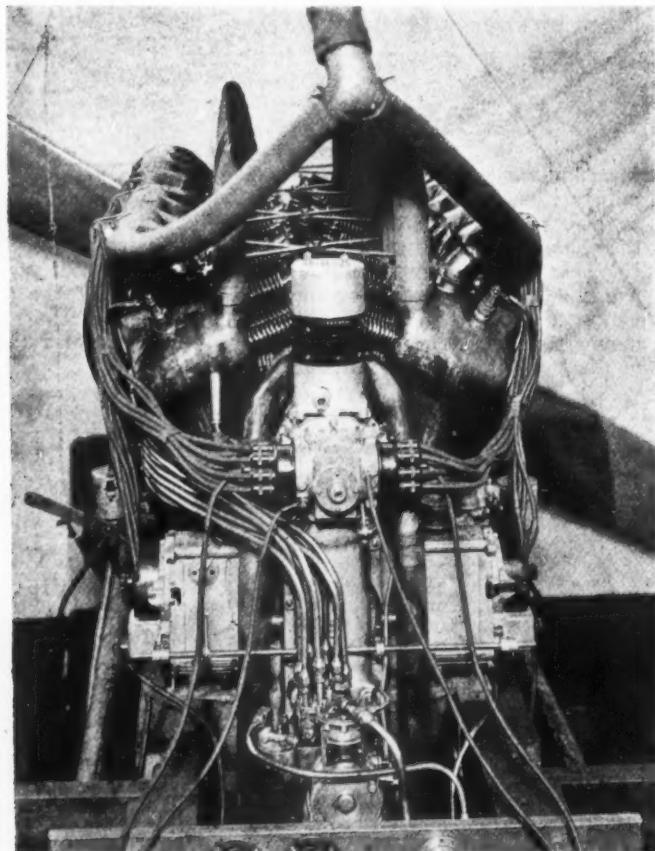
When the hammer is laid aside for a moment, it stops working, but the motor continues to run. One of the advantages claimed for this pneumatic hammer is that no moving parts whatever are used to insure the proper return of the sliding projectile to its starting position.



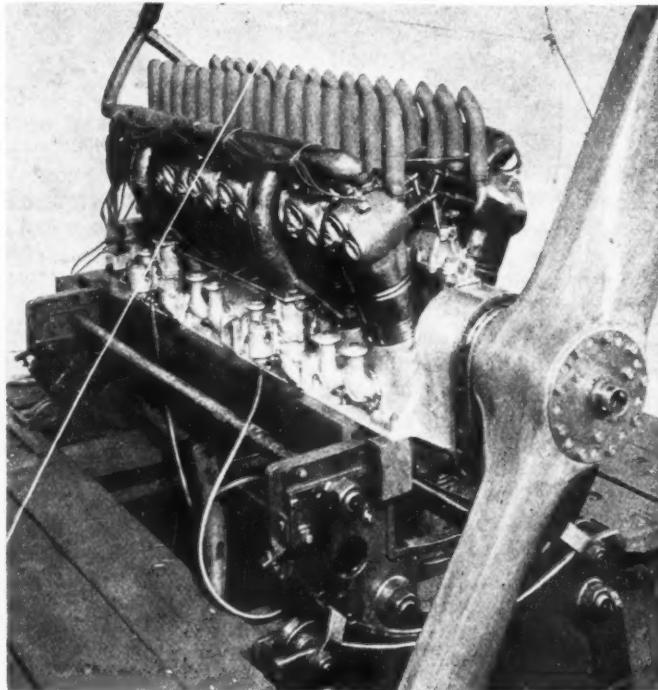
Duesenberg Sixteen-Cylinder Aircraft Engine

Largest Engine for Airplanes Ever Built in This Country—Weight Per Horse-Power Little More Than 1½ Lb.—Cylinder of Wrought Steel and Sheet Steel Jackets Welded On—Both Generator-Battery and Magneto Ignition

WHAT is probably the largest size engine ever built for aircraft purposes is a 16-cylinder V type engine constructed by the Duesenberg Motors Corp. of Elizabeth, N. J. It has forged steel cylinders with welded-on sheet steel jackets and a barrel type crankcase of cast aluminum. The cylinder bore is 6 in. and the stroke 7½ in., corresponding to a total piston displacement of 3393 cu. in. One engine of this design has been completed and has been subjected to a long series of tests and to experimental development. Three others, embodying some slight changes in design suggested by the tests of the experimental engine, are now in course of construction. While it has been the intention to build the engine in both the direct-drive and the geared-down type, the experimental engine has a reduction gear fitted. This consists of the Magg system of gearing, wherewith a greater degree of rolling motion is obtained than with ordinary involute gearing. The gears have teeth of approximately 3% diametral pitch and 4 in. face. They give a reduction in rotative speed from 1800 to 1250 r.p.m., and the center distance of the two shafts is 8 in.



Distributor end of the engine, showing air starter, magneto, battery distributors, electric generator



Three-quarter view of engine from propeller end

The cylinders are made from steel forgings and are open at both ends. The wall thickness varies along the length in accordance with the stresses to be supported, the average thickness being $\frac{1}{8}$ in. On the outside of the cylinder are turned nine circumferential flanges, including the one by which the cylinder is secured to the crank chamber. This latter is located some distance from the lower end, the cylinder being formed with a spigot extending 2½ in. into the crankcase. Most of the studs holding the cylinders to the crankcase extend through long bosses or lugs and are provided with nuts inside the case. The cylinder head is made of a series of stampings which are gas-welded together. It is cut with an internal thread and screws over the upper end of the cylinder against the topmost flange, after which it is welded in place. No. 18 gage sheet steel is the material from which the jacket is made. The latter is formed in three stampings, as shown in one of the photographs, which are welded together, to the lowest one of the small flanges and to the cylinder head. The object of the intermediate ribs is not only to strengthen the cylinder against radial force but also to help transfer the heat quickly from the cylinder wall to the cooling water. The top part of the head is a steel forging which carries a flange to which the jacket is welded. A couple of corrugations are pressed in the jacket at midlength to take up differences in expansion and contraction between the cylinder and jacket, as well as to stiffen the jacket wall.

As the maximum power which can be obtained from an

engine of a given piston displacement depends to quite a degree upon the compression carried, considerable interest attaches to the compression ratio of an airplane engine. In the Duesenberg 16-cylinder engine the ratio of compression chamber volume to total volume at the beginning of the stroke is about 21 per cent. The cylinder barrel is forged of low-percentage nickel steel and is case hardened on the inside to afford the best possible track for the aluminum piston.

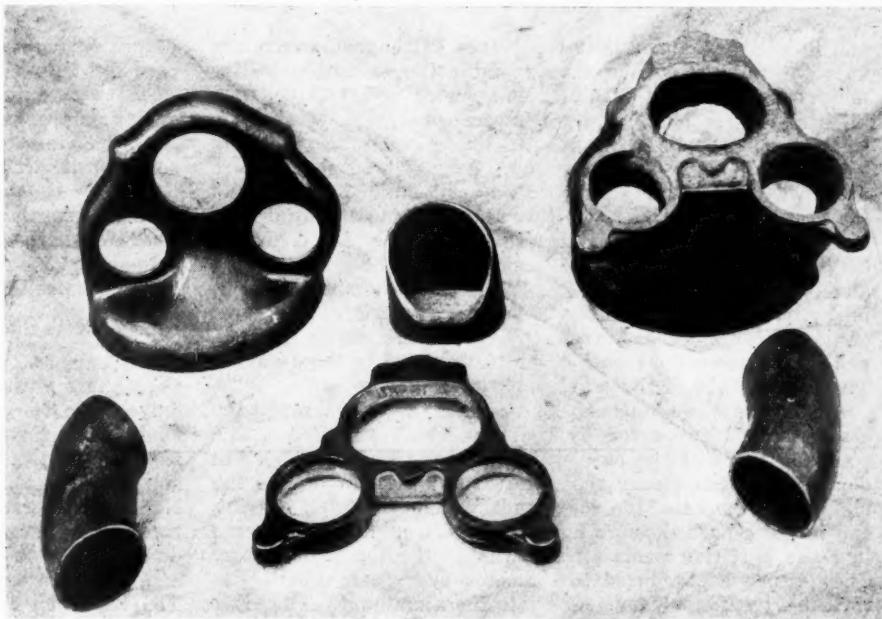
With cylinders of this large size there are naturally very heavy stresses on the lower end of the cylinder, the base flange and that part of the aluminum crank chamber to which it is bolted, due to the side thrust of the piston against the cylinder wall. By tying the individual cylinders together these stresses can be distributed and the dangers of failure greatly reduced. In the Duesenberg engine the cylinder heads are formed with lugs by which each pair of adjacent cylinders are tied together. These lugs are so located that they overlap and a bolt passes through the two. In addition each pair of opposite cylinders is tied together by a couple of steel stampings which are clamped to lugs formed on the exhaust outlet flanges on the cylinder heads, one stamping being placed on top and one below the lugs and bolts being passed through stampings and lug. Each finished cylinder weighs 22 lb. The valve arrangement is very similar to that which has always characterized Duesenberg engines of smaller size, except that each cylinder has two exhaust valves and a single inlet valve. The valves are located in the cylinder heads with their axes perpendicular to the cylinder axis. The valves are arranged in a triangle, the two exhaust valves being located directly below the single large inlet valve. Thus the cool incoming charge passes directly over the heads of the exhaust valves and tends to keep them cool. The exhaust valves have a clear diameter of 2 3/16 in. each, with 1/2 in. lift, while the inlet valve has a clear diameter of 2 15/16 in. with 9/16 in. lift.

The valve stems pass through guides bushed with Non-Gran bronze and each is surrounded by two concentric springs which together exert a pressure (when the valve is closed) of 60 lb. in the case of the exhaust and 70 lb. in the case of the inlet valve. Each valve is actuated separately through a rocker arm from the camshaft located in a housing directly above the crank chamber. This housing is cast of aluminum, in two parts joined in a horizontal plane through the camshaft axis. It extends the whole length of the crank chamber, to which it is rigidly bolted, and it adds considerably to the strength of the latter in the vertical center plane. All of the rocking levers are bushed and are threaded over a hollow, stationary pivot shaft held between the camshaft housing and caps on same. At their lower ends the rock levers carry hardened steel rollers acting as cam followers. The openings over the valves are closed by means of shaped aluminum threaded plugs. These are formed with flanges on the inside in order to facilitate heat dispersion.

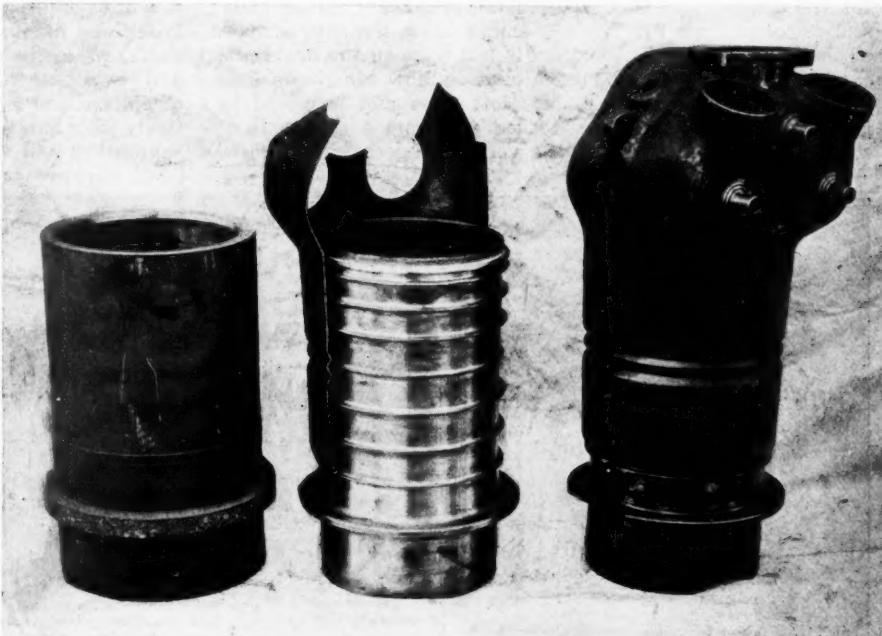
The pistons are cast of Magnalite and are formed with internal ribs for

strength and to facilitate the transfer of heat from the piston head to the skirt. Each piston carries a single triple-unit Duesenberg compression ring, the details of which may be seen in the sectional view. The pistons are 7 in. long. The piston pins, which are made of chrome-nickel steel 1 1/8 in. in diameter, hollow, hardened and ground, have bearings directly upon the aluminum of the piston bosses. The connecting rod is clamped tight in the upper end of the connecting rod by means of a screw through a split lug on top of the rod. The rods are of the tubular type, of chrome-nickel steel. One rod is of the ordinary or straight type, while the other one on the same crankpin is yoked. The practice of having the piston pin bear directly on the aluminum is old with Mr. Duesenberg, having been employed in all of his racing engines, and has proved absolutely satisfactory.

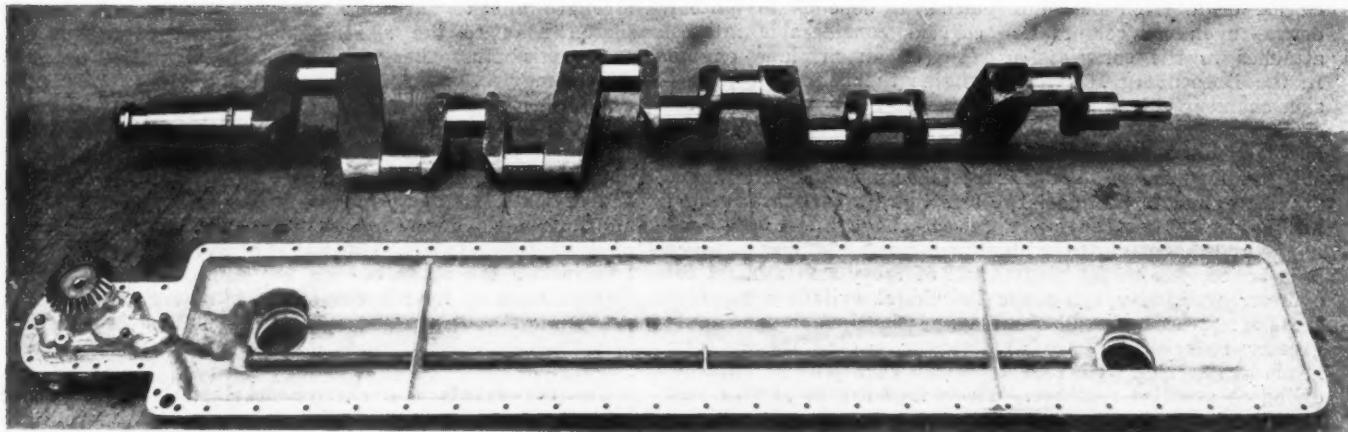
The crankshaft is a chrome-nickel steel forging of very substantial proportions. It is a five-bearing type and in one sense consists of two four-cylinder crankshafts joined end to



Parts from which the cylinder head is built up



Illustrating different stages in the manufacture of a forged steel cylinder with welded-on sheet metal jacket



Crankshaft and oil pan. Note that the oil pump is carried on the oil pan

end in such a manner that the planes of the two shafts are at right angles to each other. With the exception of the main bearing at the propeller end, which is a ball bearing, all bearings, both main and connecting-rod, consist of Non-Gran bronze shells with babbitt lining. All bearings are $2\frac{1}{2}$ in. in diameter and 3 in. long. As indicated above, there are always two throws between adjacent main bearings and the crank pins of these two throws are connected by a long crank arm which is of nearly square section but is drilled lengthwise for lightness. The short arm at the propeller end also is drilled out in this way. While the crankshaft is quite husky, it contains absolutely no surplus material. The bores of the journals decrease from the valve gear end to the propeller end where the torque to be transmitted is the greatest. The total weight of the crankshaft is 199 lb.

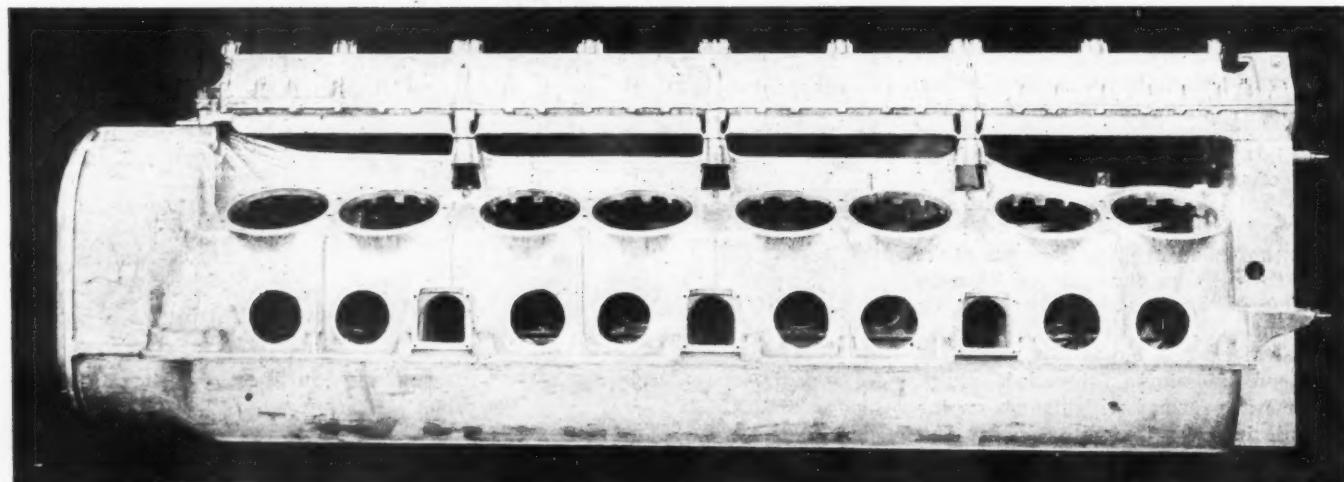
As far as the intermediate bearings are concerned, the crankshaft is supported by the crankshaft positions. The partition walls of the case which carries these bearings are double or of box girder type, and to still further add to the rigidity of the case, the four studs which hold each bearing cap in place pass through holes drilled through enlargements in these partition walls all the way to the top of the case. These studs are reduced in diameter over their middle unthreaded portion. They screw into the aluminum of the case at both ends and in addition are secured by a cotter nut at the top.

Naturally the large number of closely spaced large holes for the cylinder tends to weaken the crankcase structurally, and to compensate for this weakening effect the case is made of the barrel type. The bottom is left open in the crankcase casting and is closed by means of a shallow aluminum base plate; the propeller end is also left open and is closed by means of a steel end plate worked out from a solid slab of steel with ribs, etc., to give the very strongest form for the

weight. There are round hand holes on one side of the crankcase opposite each set of connecting-rod heads, which are closed with suitable cast cover plates. While there are box girder partitions in the crankcase at each intermediate crankshaft bearing, midway between these box girders there are substantial arch-shaped ribs and the panels of the lower portion of the case have inside diagonal or cross ribs to add to the strength of the case. A supporting flange is cast on each side of the case at the height of the crankshaft axis, for supporting the engine in the fuselage. The weight of the crankcase casing when machined is 180 lb.

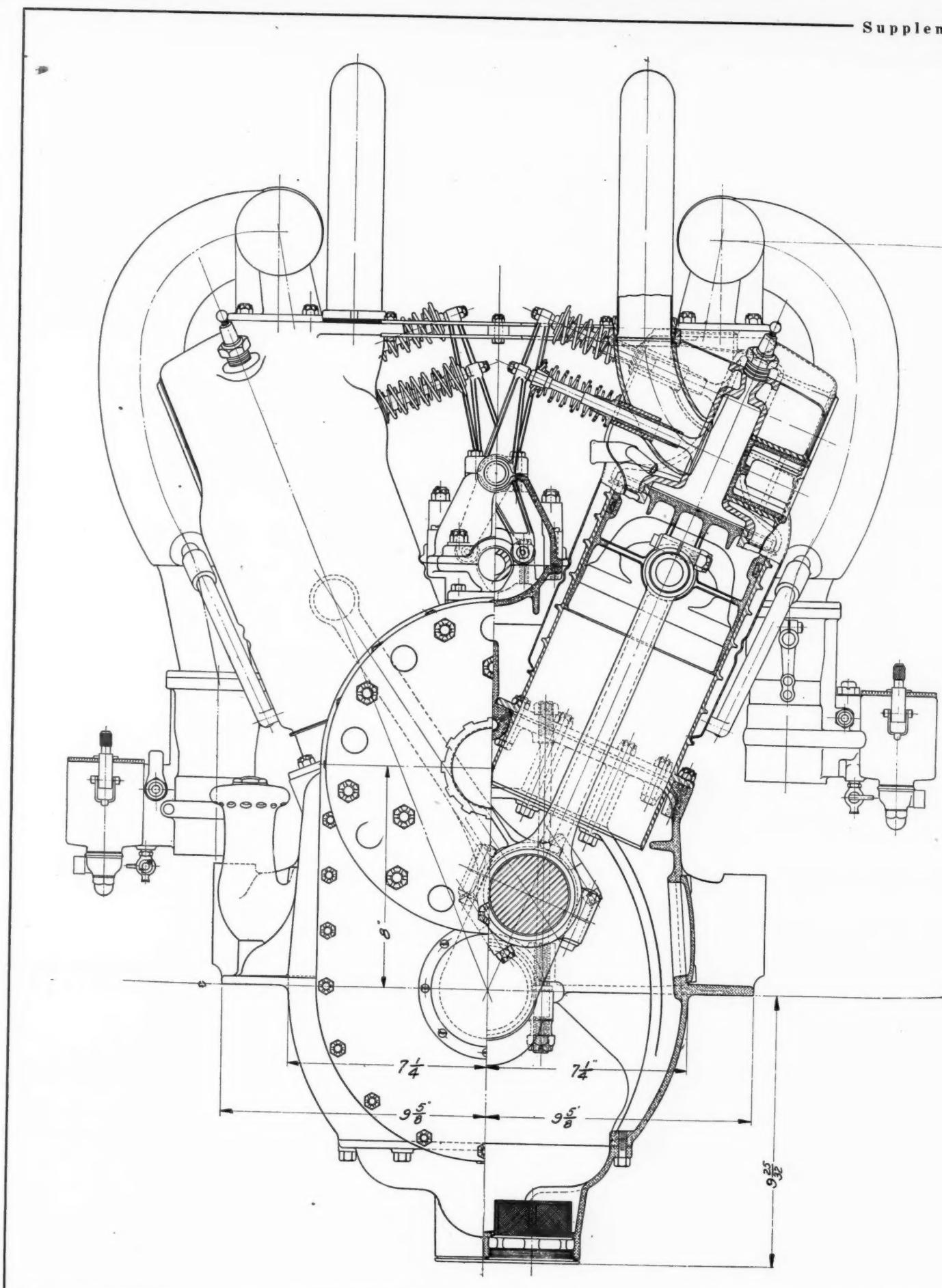
Intermediate Shaft High Speed

The camshaft is driven through the intermediary of a vertical shaft with bevel gears at both top and bottom. The drive from the crankshaft to the vertical shaft is without change in speed, so that the latter shaft runs comparatively fast and can be made correspondingly light. This shaft is supported in annular ball bearings at both top and bottom. Near its lower end the vertical shaft carries a helical gear meshing with another helical gear on a cross shaft which drives the two Dixie magnetos used for ignition. These magnetos are set on bases cast integral with the crankcase. The reduction of 2:1 required for the camshaft is obtained at the upper end of the vertical shaft, where a small pinion meshes with a bevel gear of twice the number of teeth on the forward end of the camshaft. As a matter of construction it is interesting to point out that the bevel gear at the lower end of the vertical shaft is forged integral with the shaft, while the bevel pinion at the upper end of this shaft and bevel gear on the camshaft are secured in place by means of splined joints. Both of these latter gears have comparatively long hubs on which are mounted the inner races of the supporting ball bearings.



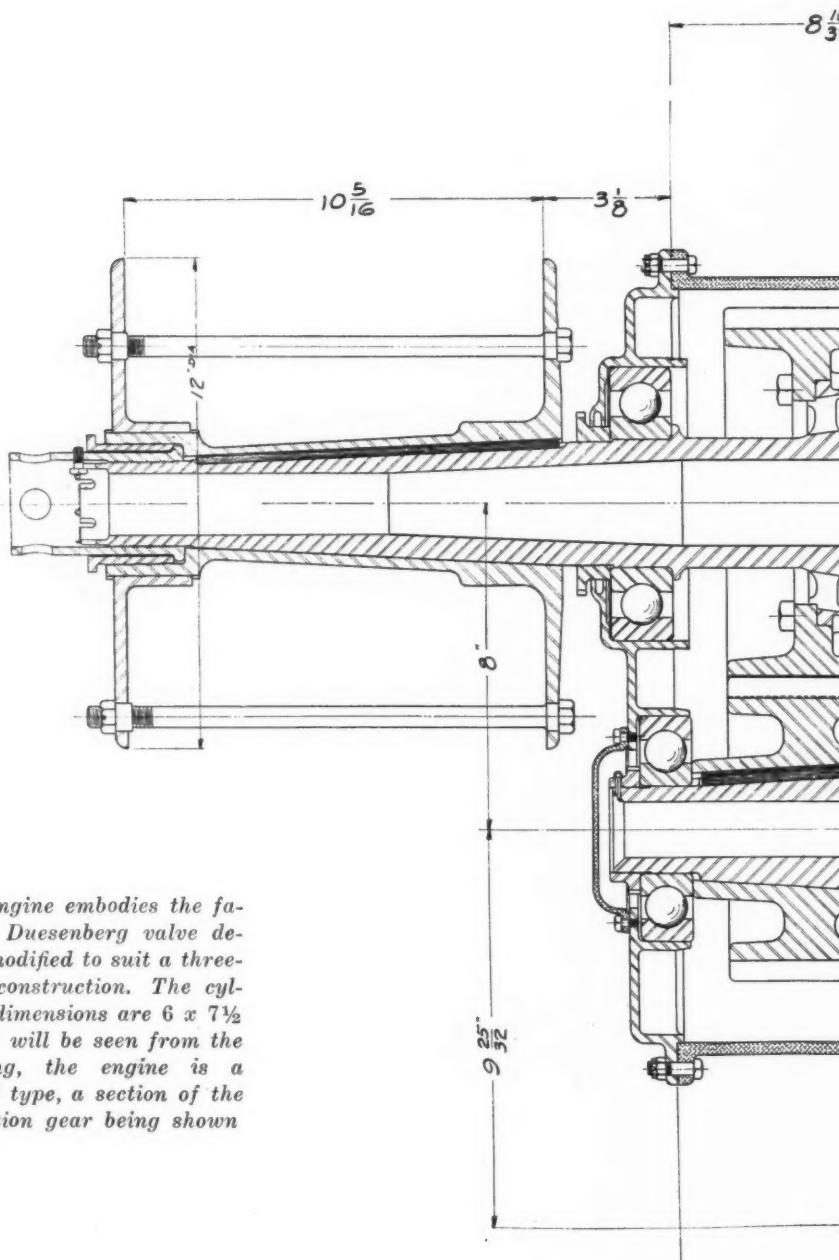
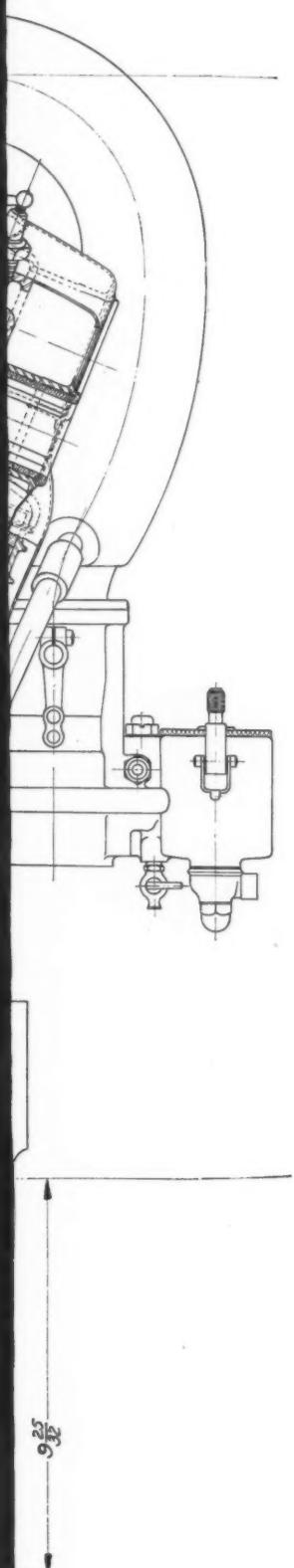
Side view of crankcase and camshaft housing, bringing out the girder effect of the camshaft housing

Dues



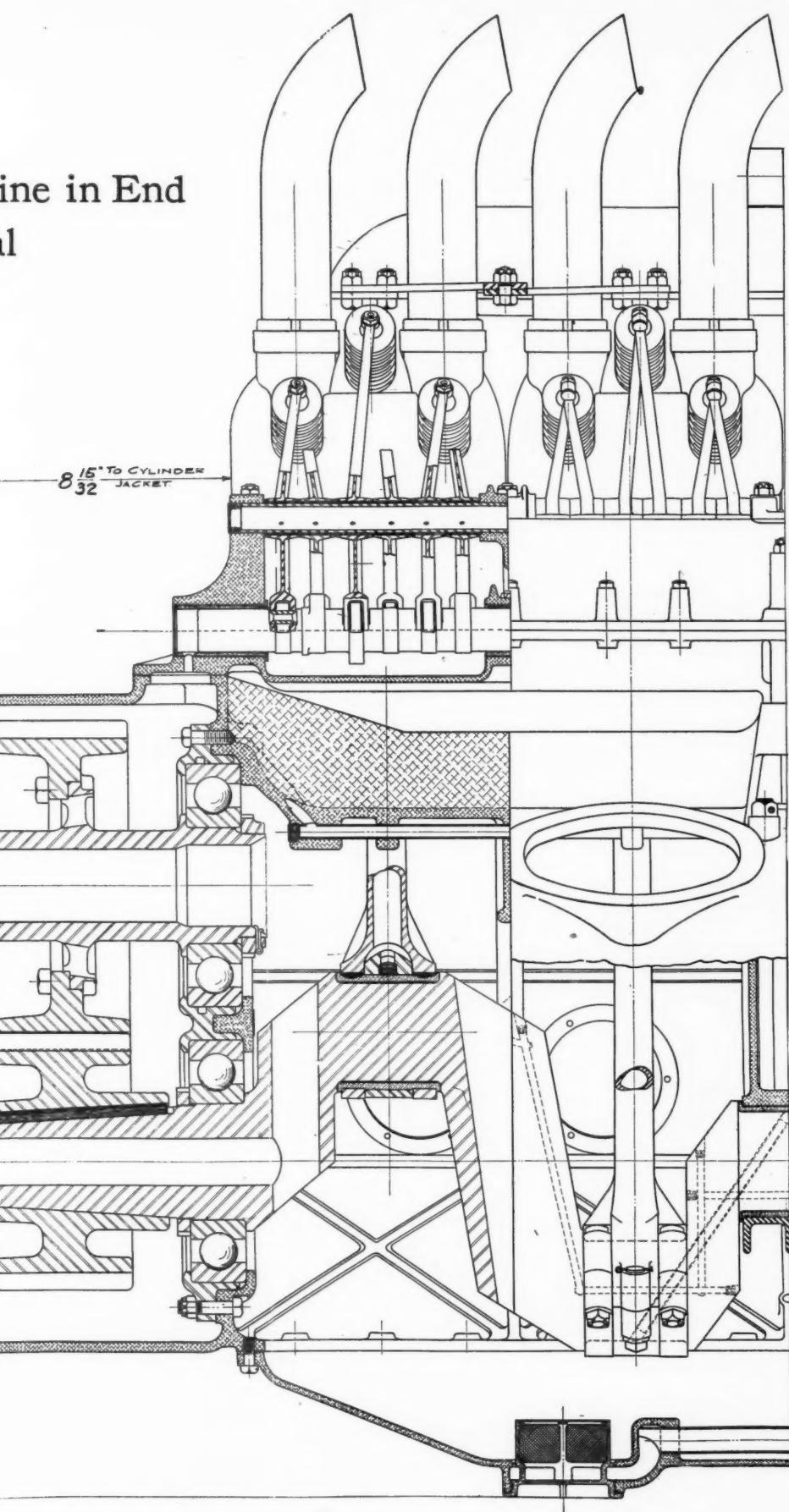
This engine is a familiar Duesenberg design, modified in the valve construction and cylinder dimensions. As will be seen in the drawing, the engine is of the geared type, with a reduction gear.

Duesenberg 16-Cylinder Aircraft Engine in Elevation and Longitudinal Section

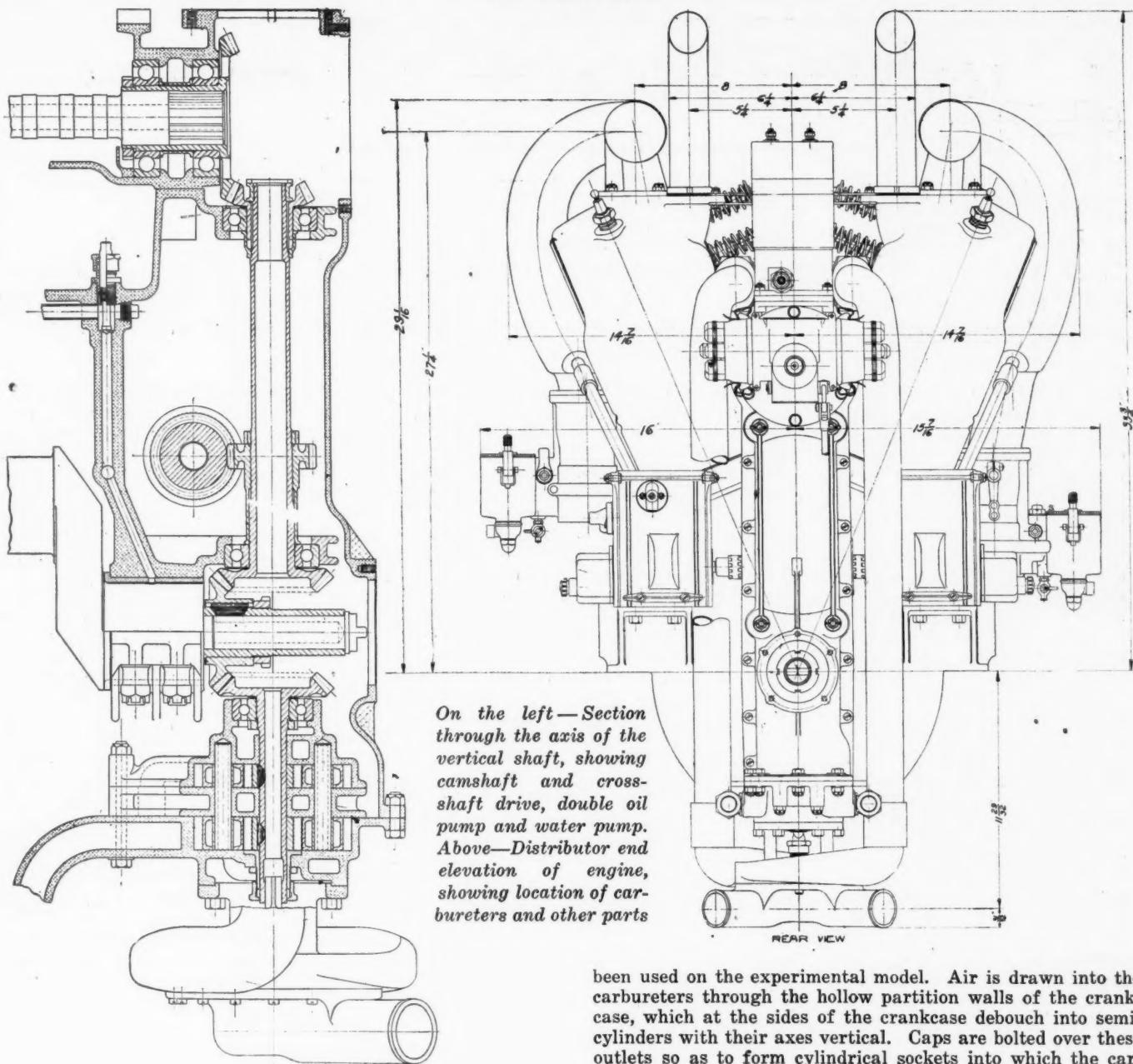


This engine embodies the familiar Duesenberg valve design, modified to suit a three-valve construction. The cylinder dimensions are 6 x 7 1/2 in. As will be seen from the drawing, the engine is a geared type, a section of the reduction gear being shown

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The camshaft is an integral forging with a main diameter of $1\frac{1}{4}$ in., the base circle of the cams being $1\frac{5}{16}$ in. The vertical shaft together with the gearing for the camshaft and the accessories is enclosed in an aluminum housing forming part of the crankcase casting. To the top of this housing may be bolted a vertical generator of Delco design, which is driven from the camshaft bevel gear. Directly below the crankshaft is mounted the oil pump, which is of the triple gear type and made in two sections, and below this is arranged the water pump, which is of the centrifugal type with two outlets. Both the oil pump and the water pump are driven through the same vertical shaft, which is in fact the shaft of the oil pump and which has the driving bevel gear forged integral with it.

In addition to magneto ignition provision is made for battery ignition, and a combination interrupter and distributor of Delco design is bolted to the vertical shaft housing directly in line with the camshaft. This distributor is driven from the camshaft by means of an integral key engaging with a transverse slot cut into the forward end of the camshaft. It is double-ended, eight cables extending from each end to one set of cylinders.

Combustible mixture is supplied to the sixteen cylinders by four carburetors of $2\frac{1}{4}$ in. size. Miller carburetors have

been used on the experimental model. Air is drawn into the carburetors through the hollow partition walls of the crankcase, which at the sides of the crankcase debouch into semi-cylinders with their axes vertical. Caps are bolted over these outlets so as to form cylindrical sockets into which the carburetors are set. On one side of the motor two of the carburetors are connected directly to the crank chamber and on the other side the two carburetors are fastened to an air duct, which in turn is secured to the crankcase opposite the central box girder. The ends of the box girder passages through which the air enters are intended to be connected up to funnels or scoops extending forward from the engine outside the fuselage, so as to take advantage of the speed of the plane to fill the cylinders.

Of the two sections of the oil pump one is a feed pump and the other a scavenging pump, the lubricating system used being that known as the dry sump system. The pumps are mounted on the crankcase pan and are driven at crankshaft speed. The delivery pump forces oil through a single main oil lead fitted into the crankcase to each main bearing. The main distributing lead is fitted into the crankcase with packing glands, this being made necessary by the comparatively high oil pressure employed, which rises to 75 lb. per sq. in. when the engine runs at full speed. From this main distributing line a lead is taken off at the valve drive end, containing a regulating or pressure reducing valve which reduces the pressure on the oil to $2\frac{1}{8}$ lb. per sq. in. This low pressure line extends along the top of the crank chamber and from it there are two upward passages to the hollow camshaft and to the hollow rocker shaft. There are also passages through the cylinder flanges and cylinder walls, through which oil is

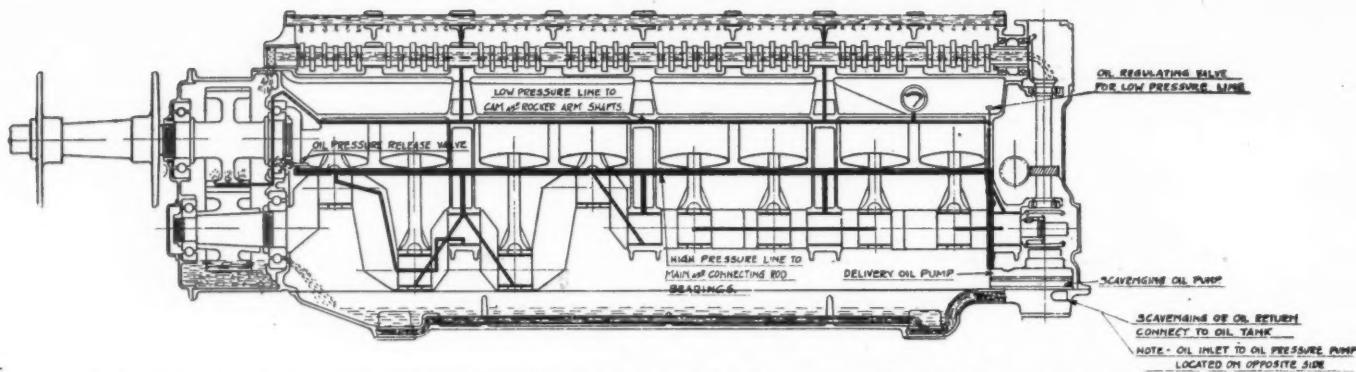


Diagram of the lubricating system, showing distribution of oil to main and crankpin bearings, to camshaft and rocker arm shaft

injected into the cylinders to insure their lubrication. The excess oil from the rocker shaft drops on to the camshaft and insures effective lubrication of the cams and rollers. The oil working out at the ends of the hollow camshaft returns through the reduction gear case, and the housing of the vertical shaft is at the opposite end of the engine. There is also a lead from the low pressure distributing pipe extending through the upper part of the crankcase into the gear reduction case, which has three lateral outlets opposite the gear close to where they mesh, so that there is a constant supply of oil to the gear teeth as they come in contact. There is at all times a supply of oil in the bottom of the gear reduction case, the height of which is determined by the ball bearing on the end of the crankshaft. The scavenging pump draws oil through large-sized strainers at each end of the crankcase. Owing to the use of these two inlet pipes, this scavenging pump will drain the crankcase no matter in which direction the engine is inclined.

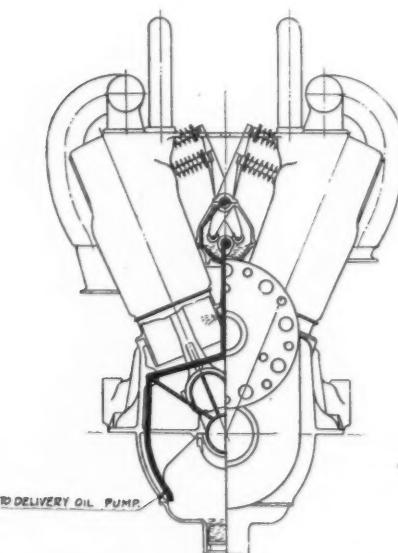
It was stated above that all of the main bearings of the engine were supplied with oil directly from the main distributing line. The crank pin bearings get their supply from the main bearings through passages drilled through the crankshaft. In the case of the crank pin bearing closest to the propeller end the oil has to pass from the nearest intermediate bearing through a short crank arm, a crank pin and a long crank arm. While the oil overflows from the cam housing at both ends, there is a dam at the vertical drive shaft end which determines the level of the oil in the camshaft housing.

Water circulation is insured by the centrifugal pump already referred to, which, as stated, has a double outlet, one to each cylinder set. The water enters the jackets of the cylinder heads through water distributors with triple outlets. Two of these outlets direct streams against the exhaust valve

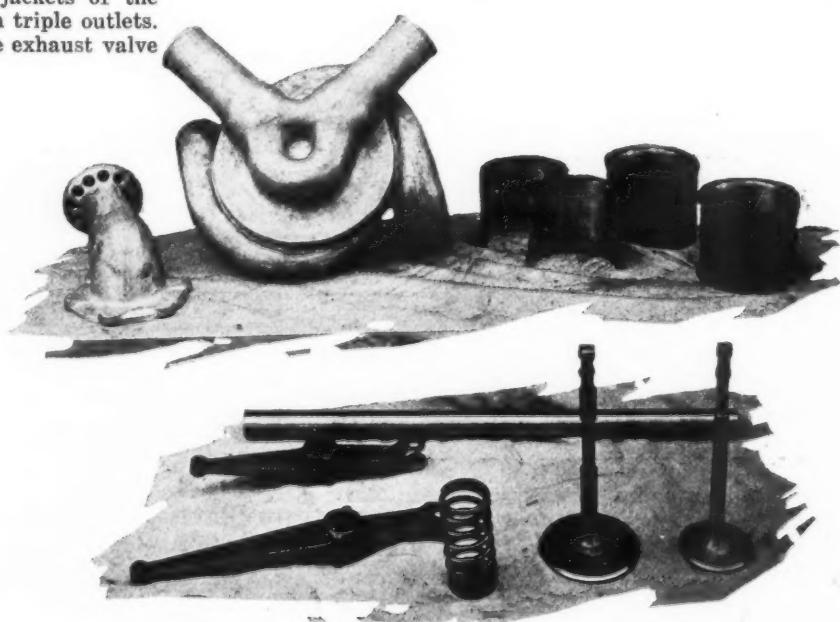
seats, whereas the third outlet directs a stream down the cylinder jacket. In addition to the regular water return connection there is an outlet connection at the bottom of the cylinder jackets, the object being to prevent the formation of any dead spaces in the cooling jacket. The intake manifolds are water-jacketed and the water leaving the cylinder jackets passes through the jackets of the intake manifolds and thence to the radiator. The inlet manifold is held in position by means of a stamped steel piece, which also acts as a tie rod.

The weight of this engine with carburetors and magnetos is 1250 lb. Its output on direct drive, that is, with the propeller mounted directly on the end of the crankshaft, which does not admit of the highest speed of which the engine is capable, is 700 hp. When produced as a geared job, with the propeller turning at 1350 r.p.m., the output is given as 800 hp. No very extensive fuel consumption tests have been made, but from what observations have been taken it is believed that the consumption can be held within 0.56 lb. per hp.-hr., and the oil consumption is very light. The engine shows remarkable acceleration, and when under test on the dynamometer the torque was observed to be unusually steady.

A few words may be added regarding the reduction gear with which the experimental machine is equipped. The housing of this gear is cast integral with the crankcase, but the bearings are located in steel plates worked out from solid steel slabs which are secured to the aluminum housing by numerous bolts. The use of these very strong steel bearing plates prevents the spreading of the bearings in spite of the enormous radial pressure due to the gear reaction.



Illustrating oil delivery to cylinders from pressure system



Above—Double outlet water pump and crankshaft bushings
Below—Valve spring, rocker arms and rocker shaft

Reducing Industrial Fatigue

An Outline of the Principal Causes of Diminished Output, with Concrete Suggestions for Overcoming Them

In the present emergency caused by the war it is desirable to understand all practicable ways by which industrial work may be made more efficient and output may be increased to a maximum without resorting to unwise or burdensome demands on labor. It is often possible to increase output temporarily by increasing the work of the employee, but if he is overworked his output soon falls off; hence such a method, if carried far, quickly defeats itself and in the long run is not profitable. Given adequate equipment, adequate administration of the plant, and a proper spirit among the employees, fatigue is the greatest single obstacle to a maximum output. Fatigue diminishes output not only directly, but indirectly, by increasing accidents and the proportion of spoiled work and by causing sickness and absences of employees. It will, therefore, be profitable to employers, to employees and to the Nation itself, to inquire into the ways that fatigue may be reduced.

Everyone knows that a certain degree of fatigue is the normal result of bodily activity and is harmless. But it is not so generally recognized that the onset of over-fatigue may be greatly hastened, and that through its deleterious effects on both the worker and the plant may be caused by the conditions of work inside the factories, or by the occupation, habits and conditions of living of the workers outside the factories, or by both.

In order to be sure that an individual is really fatigued, objective methods of measurement must be used—one often feels tired without actually being so, and likewise fatigue is often present before it is recognized by the individual. Fatigue may be detected by various tests, some of which have been studied so carefully and so improved that they can now be considered as fairly accurate and useful for practical purposes. Different methods are applicable to different cases.

Amount of output.—One of the readiest means of detecting fatigue is by keeping a record of the output of the individual employee by the hour, the day, or the week,

and observing its course. A falling off in the output, when not explicable by other changes in the conditions of the work, indicates fatigue. Where the duration of the working period has been changed, fatigue can also be tested by comparing the average output per hour under the earlier and the later schedules.

Amount of power used.—A fall in the amount of electrical or other power consumed in a factory, or one of its departments, is often an excellent index of decreased output and thus of the fatigue of the workers. Lessened consumption of power must of course be discounted where it results from temporary shutdowns or other causes.

Other indicators of fatigue.—Fatigue is also often indicated by the amount of spoiled work turned out by the workers, by the number of accidents to the workers occurring during a working period, by the number of absences from work, and, in extreme cases, by records of sickness.

Laboratory tests of fatigue.—There are various tests of the presence of fatigue that have been supplied by the laboratories, some of which are applicable to industrial workers. These concern the muscles, the nervous system, sight, and hearing, and certain chemical changes within the body.

Ways of Reducing Fatigue

Various ways are now known by which fatigue can be reduced without decreasing the output and even in some cases with an increase of it. When fatigue is caused by work inside factories it is obviously controlled more easily than when caused by the conditions of living of the workers outside.

Introducing recess periods.—One of the common methods of reducing fatigue is by introducing recess or resting periods during a working spell. During such periods, which, in order to be effective, must be obligatory, and not discretionary on the part of the workers, they should have an opportunity to rest, relax, move about

The Divisional Committee on Industrial Fatigue has been active in planning and conducting investigations in factories that are manufacturing war supplies, for the purpose of determining whether unnecessary fatigue is present and discovering the conditions under which a maximum continuous output may be obtained. The work of investigation has been carried on under the auspices of the Division of Scientific Research of the United States Public Health Service, which appointed to its staff several members of the committee and paid the entire expenses of the investigations. In addition to the work of investigation, the divisional committee has prepared this paper on "How Industrial Fatigue May Be Reduced." It is intended chiefly for manufacturers, and presents in direct form some of the principal phases of the subject as it is now known.

and engage in other simple recreation. A little food or a cup of tea or cocoa taken at such a time is often remarkably restorative. A very striking instance of the benefits of resting periods has recently been published. "Two officers at the front recently, for a friendly wager, competed in making equal lengths of a certain trench, each with an equal squad of men. One let his men work as they pleased, but as hard as possible. The other divided his men into three sets to work in rotation, each set digging their hardest for five minutes and then resting for ten, till their spell of labor came again. The latter team won easily." It often happens that several five-minute resting periods may be advantageously introduced into a working spell. Where this is not practicable a single recess, of suitable duration, may suffice. The recuperation thus gained by a tired worker often increases his working capacity for the remainder of the spell. If pieceworkers object to such compulsory resting periods, fearing loss of wages, it is even profitable to guarantee that during the introduction of the change the total day's wage shall not be less than before the resting periods were installed. Experience has demonstrated that after such periods have been established the resulting increased efficiency usually yields equal, if not greater, output.

Introducing variety into work.—Much of the modern industrial work consists of a constant and rapid repetition of the same movement. A woman worker in one of our munition factories was recently observed to handle during her day's work 24,000 pieces of a shell fuse and put them through a special process. From 7 o'clock in the morning until 12 and from 1 until 6 she sat at her machine and fed it with the succession of brass pieces. The occasional introduction of a little variety into her work by training her to some alternative process might easily have diminished her fatigue without diminishing the number of finished pieces.

Adjusting the speed.—The capacities of different workers vary greatly. In order to secure uniformity in the work of a squad, where a single motor operates a number of machines, the speed of the motor must be adjusted to the average pace. It may be advantageous to transfer to another job an especially fast or slow person. It is of the utmost importance that each member of the squad should be able to work with the same rhythm and that the speed of operation should be adjusted to this rhythm. Fatigue is least when the speed is in consonance with the worker's customary rhythm, and the output may be twice as great as with a speed a little slower or even faster than this. The worker's speed, however, depends not merely on the adjustment of mechanical appliances, but is also often increased by a well-planned system of incentives, which may consist of piece rates or bonuses, or the making of the work itself more interesting and attractive.

Omitting unnecessary motions.—The pieces which the worker has to handle should be so placed with reference to height and distance from his hands that he is obliged to make no awkward, unrhythmic and unnecessary motions or excessive muscular exertions in handling them. His work can thus be done with the least possible waste of energy and time.

Providing adjustable seats.—Where workers are obliged to sit instead of stand at their work, the seats should not be of uniform heights, but should be adjusted to the individual worker, with backs of such shape and position as best to fit and support the worker's back. Such seats have recently been introduced in some of our large factories. Where the worker's feet can not reach the floor, foot rests should be provided. Such rests can be simply made by fastening a narrow board platform to the legs of the seat at the proper height from the floor.

Ventilation of workrooms.—The ventilation of workrooms is an important aid to efficiency and should conform to the principles of ventilation now accepted. The recent investigation of ventilation has demonstrated that excessive heat and humidity should be avoided so far as possible and that air should be kept in motion. When the worker is in a hot room, and especially when heat and humidity are combined, his bodily temperature rises, often several degrees, and he is put into a feverish state. While movement of the air will not cool the air, it will cool the skin and hence will keep down the bodily temperature to the healthful level. If possible, windows should be wide open; but where this is not possible and wherever even with open windows the heat of the workrooms rises above 68 deg., forced drafts or electric fans should be used to keep the air in motion. It is astonishing how easily a comfortable and refreshing bodily condition may be maintained by the use of electric fans. Air currents should not, however, be too strong. Bodily discomfort is caused by excessive drafts, and a gentle movement of air is the most effective. Uniformity in the play of air on the skin is undesirable; an oscillating electric fan or a frequent change in the rate of the forced drafts gives the best results.

Sanitary conditions within factories.—As accessory but none the less important means by which fatigue may be lessened and the efficiency of workers increased, there may be mentioned certain general sanitary conditions within factories:

1. Adequate lighting, with the light properly distributed and yet sufficiently concentrated on the work in hand to prevent eye strain.
2. An exhaust system to remove deleterious fumes and dust.
3. Abundant drinking water, cool but not ice cold, within easy reach of the worker.
4. Attractive, quiet rest rooms, especially for women, in which in times of need tired workers may find relief.
5. Lunch rooms or canteens, where a hot lunch of nourishing food, selected according to a scientific dietary, and well cooked, may be purchased at cost prices and eaten amid attractive surroundings free from the influence of the saloon.
6. Clean, well-ventilated modern toilets.

Washing facilities, with abundant soap and clean towels, and especially shower baths, where the hot, sweaty, begrimed worker may become cool and clean before leaving the plant.

Alternating day and night work.—The industrial urgencies of the war have caused many factories to run both day and night, and have thus increased greatly the total amount of night work performed. Man is not naturally a nocturnal animal, and under our present social arrangements night work must always be regarded as undesirable on physiological grounds. Lack of sleep produces fatigue. The day sleep of night workers is likely to be curtailed, and in the long run night work is likely to be detrimental to health. This is probably more true of women than of men. The needs of the nation may require night work as an emergency measure, but this necessity should not obscure its dangers to health. If night work must at times be done, the question arises whether it is more profitable to keep the same workers on the night shift, or to change them at intervals, say every other week, from night to day, at the same time shifting the day workers to night work. The British Health of Munition Workers Committee has made a very careful statistical study of the output under both systems and has found that where the same night shift continues to be employed the total output is less than where there is an alternation of day and night work. This is

true of both men and women. Where night work is unavoidable, therefore, fatigue can to some extent be avoided by allowing the workers to alternate at intervals between day and night, the periods to be not less than one month in duration. Frequent changes of habits may be deleterious to health.

Adjusting hours of work.—A very obvious way to reduce fatigue is by adjusting the number of daily hours of labor. The British Health of Munition Workers Committee has found that it is a mistake to recommend a uniform day for all kinds of work, that the most profitable duration of the working period varies considerably with the nature of the occupation, and that women and boys, even when engaged in moderate and light types of work, are unable to stand as long hours as men. Within obvious limits, the length of the working day that avoids excessive fatigue can be determined for the individual process only by a careful study, in each combination of circumstances, of the effect of the work on the workers. The general tendency for many years in industrialism has been to decrease the hours of labor. The one great objection that is usually raised against a proposal to decrease hours is that the output would be correspondingly diminished; and accordingly, whenever, as at the present time, unusual strain is brought upon industries and the greatest output is desired, there is a tendency to increase hours and to introduce overtime work. This objection to decreased hours and this tendency to increase them rest in considerable part on a mistaken notion. It is obvious that a man can do more work in two hours than in one hour; but it does not necessarily follow from this that he can do more in 12 hours than in 10, or more in 10 hours than in 8. In fact, whenever the work is of such duration that fatigue begins to be pronounced, it has been shown again and again that shortening the working period actually increases the amount of work done.

This may not always be evident in the first few weeks, but it appears later. Innumerable instances of this might be quoted. Thus a certain granite-cutting company found that "the same man under identically the same conditions accomplished more of exactly the same kind of work when he was working 9 hours than he did when he was working 10 hours. And again when the hours were reduced to 8 hours this same man accomplished still more in an 8-hour day than he did in a 9-hour day, or a considerable amount more than he did when the day was 10 hours long." In an English munition factory when the average weekly hours of men sizing fuse bodies were reduced from 58.2 to 51.2 the total output was increased 21 per cent. In the English factories the absences of employees from their work have increased enormously since the war began. In one of the largest munition factories, employing 70,000 hands, the efficiency of the work was thus greatly interfered with. The employers were advised to give their hands a whole holiday, instead of a half holiday, on Saturday. This was done, and the absences were diminished by 50 per cent.

The exact relationship between length of day and quantity of output is not yet fully investigated for all conditions, but the great preponderance of evidence favors a reasonably short working day even in the interests of the industries themselves.

Avoiding overtime.—Arguments that favor the short working day apply directly to the question of overtime. If the usual day's work is such as just to stop short of undue fatigue, overtime means overwork. It is of course sometimes necessary, in order to complete a contract within a required time, to call on the workers to expend the greater effort required. It is, however, a dangerous expedient and a particularly insidious way of diminishing

a worker's efficiency. Overtime work is apt to result in an increased amount of spoiled work and in lessened output and increased absences on subsequent days, and because of this and also in view of the increased rate of wages that must usually be paid overtime is not as profitable as is often supposed.

Omitting Sunday work.—The same principle holds for the duration of weekly labor. It is generally acknowledged by those who have studied the question most carefully that all workers should have one day's rest in seven. At the beginning of the war the amount of Sunday work in the industries of the world was greatly increased. After little more than a year the British Health of Munition Workers Committee reported as follows:

Statements are made by many employers that seven days' labor only produces six days' output, that reductions in Sunday work have not, in fact, involved any appreciable loss of output, and even the less observant of the managers seem to be impressed with the fact that the strain is showing an evil effect. * * * The evidence before the committee has led them strongly to hold that if the maximum output is to be secured and maintained for any length of time, a weekly period of rest must be allowed. Except for quite short periods, continuous work, in their view, is a profound mistake and does not pay—output is not increased. On economic and social grounds alike this weekly period of rest is best provided on Sunday.

Sanitary conditions outside factories.—Fatigue resulting from the work inside the plant will appear sooner and be a more serious hindrance to output if the worker is not in sound condition of body and mind when he comes to his task. Anything which an employer can do outside the plant to promote bodily health and vigor and mental contentment is in the long run profitable. It aids in securing a higher class of workers, greater loyalty to the company, a lessened labor turnover, greater skill, and greater general efficiency. Modern housing, attractive home surroundings, opportunities for healthful recreation, club facilities—whatever will keep workers away from the saloons and other places deleterious to health—are all safeguards against industrial fatigue.

The above are some of the ways by which fatigue in industrial occupations may be reduced. Their applicability varies with the different occupations of workers. Conservation of the working power of our industrial army is as essential to our success in the war as is conservation of our military and naval efficiency and our food. Great Britain has been foremost among our allies in recognizing this, after having made during the first year of the war the costly mistake of wasting her industrial forces through needless and avoidable fatigue.

In this country the Division on Industrial Fatigue, composed of scientists organized under the Committee on Labor of the Council of National Defense and working in co-operation with the Public Health Service, is now engaged in examining munition factories and other industrial establishments that are manufacturing war supplies. It aims to bring together the combined resources of scientific investigation and the practical experience of industries in this and other countries to show how avoidable fatigue may be eliminated, and how in the present exigency the greatest output of the necessities of war may be secured compatible with the maintenance of the working power of the workers. The Divisional Committee is contributing freely the time, knowledge and experience of its members for the benefit of the industrial work of the country and thus for the Federal service. Should any industrial corporation that is now engaged in manufacturing war supplies desire the services of the committee, communications should be addressed to the executive secretary at the office of the committee, 437 West Fifty-ninth Street, New York City.

Heald No. 65 Cylinder Grinder

Of More Rigid Construction Than the Older Type and Is Better Adapted to Manufacturing Operations—Driving Mechanism Also Improved

THE Heald cylinder grinder, which has long been favorably known to gasoline engine manufacturers, has recently been redesigned, the new model being known as the No. 65. The machine has been made more of a one-purpose manufacturing tool and less of a universal machine, whereby its efficiency in manufacturing operation has been increased.

Both the eccentric grinding head and the work table are now supported by a solid bed, where formerly the work table was supported on a knee that could be moved up and down on the face of the column of the machine. This arrangement may have been an advantage in repair work, as parts, of widely different form could be put into the machine and lined up for having holes in them ground out. In manufacturing operations, however, when the work is confined to cylinder grinding, this wide range of vertical adjustment is of no advantage, and the greater rigidity obtained when both the grinding head and the work table are mounted on the same bed is especially desirable. Sometimes it will happen that one of the bores in a multi-cylinder casting is machined with its axis out of plane with the other bores. It then becomes necessary, in centering the grinding head, to adjust the work table, and for this purpose a means of vertical adjustment, affording a range of $\frac{1}{8}$ in., has been provided. This adjustment is obtained by means of a slide between the main bed and the cross slide. This slide moves on inclined ways on the bed, and when moved in the direction of the axis of the main table, also moves up or down. It is moved by means of a bevel gear and screw and nut mechanism. The shaft of the driving bevel gear extends out from the bed at the front of the machine, and can be turned by means of a hand crank, which can be applied to it.

The dogs for controlling the travel of the table, instead of being mounted on the bed, are carried on a dog bar which is supported by the intermediate slide. The advantage of this arrangement is that the position of the grinding wheel

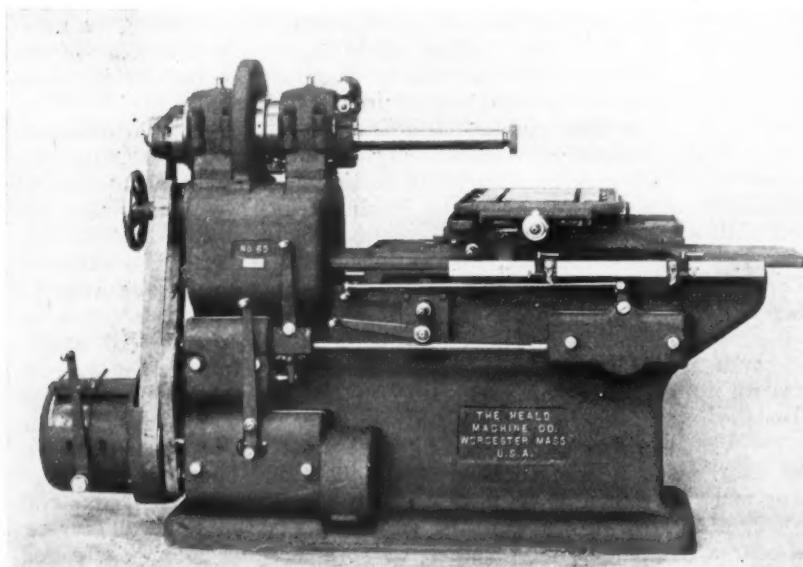
relative to the work is not changed by any vertical adjustment of the work.

On the rear of the machine is the main driving shaft, which takes the power directly from the main line, thus dispensing with a countershaft. This constitutes what is known as a single pulley drive, and makes the machine entirely self-contained. The grinding spindle is driven from this main shaft through a flexible idler, which maintains a uniform belt tension. This idler and the long spring putting it under tension are clearly shown in the end view of the machine herewith. For grinding holes of various diameters, different speeds of the wheel are required, and these are obtained by means of interchangeable pulleys on the wheel spindle.

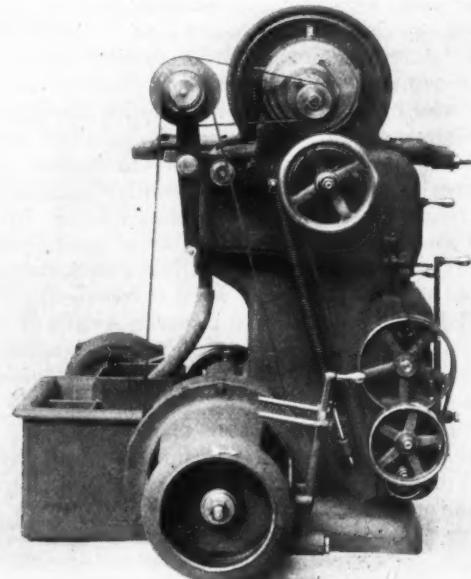
Speed Box in Front

Looking at the front of the machine, in the lower left hand corner of the bed is seen the main speed box, which is driven directly from the driveshaft by a belt through the bed. By means of this speed box the eccentric can be given two different speeds, the speed box containing two pairs of spur gears controlled by individual friction clutches. The lever for operating these clutches is plainly seen in the front view. The box above the one referred to controls the main table and affords three different rates of speed at which the work can be fed past the wheel. It contains a double cone of gears, which is operated by means of a sliding key controlled by an upright lever.

The speed box is connected with the automatic reverse box on the right hand end of the machine by a plain shaft, which can be seen in the front view. The reversal of the table may be controlled independently by a small hand lever located directly above the starting lever. This reversing lever is located in a position very convenient for the operator. In fact, all of the control levers are located close together, so that the operator can reach them without any



Front view of Heald No. 65 grinder, showing speed boxes and control levers



End view of grinder, showing automatic belt tensioning device

special effort. By means of a friction clutch inside the base, which is operated by the large horizontal lever at the front of the machine, the main table can be started and stopped. In order to permit the operator to rapidly adjust the work slide, a hand feed has been provided for the table.

The main table slides on ways of the dove-tail form with a heavy gib. Oil pockets and rolls provide for ample lubrication. The main table is provided with large bearing surfaces and has been made of sufficient length to protect the ways on which it slides from grit and dust.

The machine has a cross-slide for accurate cross adjustment of the work. The feed screw has a graduated dial reading to thousandths of an inch, and adjustable dogs are also provided for indicating the center to center distance between cylinder bores. No important changes have been made in the design of the grinding wheel spindle and the feeding arrangement for the eccentric, as these features have been found very satisfactory in the former No. 60 machine.

On the main driving shaft at the back of the machine is a pulley for driving the lubricant pump. This latter is of the horizontal centrifugal type. Provisions are made in the design of the work table and intermediate slides to catch the lubricant which flows through a channel in front of the rear of the bed, and then into the pump reservoir. The cover of this reservoir has several compartments, the partitions being so arranged that most of the sediment is removed before it enters the tank proper. Provisions are also made for driving an exhaust fan from the main drive shaft. These fans are sometimes used in cylinder grinding to carry away the material as fast as it is removed by the wheel.

Roffy Non-glaring Headlamp

J. T. ROFFY, of Brooklyn, N. Y., who has done considerable work in the vehicle lighting field, has recently developed a new headlamp which projects a very strong beam of light forward and at the same time permits of complying with the laws prohibiting annoying glare. In the Roffy lamp a reflector similar to the usual type is combined with an inverted reflector ahead of the bulb. The forward part of the bulb is frosted, so that no direct rays from the filament can strike the eyes of persons in the road. The main reflector, instead of being of parabolic form, is a compromise between a parabolic and a spherical reflector. Mr.

Roffy states that with a parabolic reflector and the ordinary type of filament, rings of light are produced, while with a plain spherical reflector the light is dispersed too much, and it is impossible to obtain a strong parallel beam. The intermediate type of reflector does away with the rings, giving a uniform beam of great intensity. The light bulb is surrounded by the main reflector to an angle of 105 deg. The annular reflector in front of the main reflector does not throw the rays back upon themselves, as is sometimes done to intensify the source of light, but has its focus at a point ahead of the focus of the main reflector. As a matter of fact, the rays of light from the filament striking this annulus are reflected on to the screen surrounding the tip of the bulb, and are reflected by this screen, which thus presents a large, luminous surface giving a mellow light. No part of the filament is directly visible to the eye, and Mr. Roffy contends that owing to this fact, where it is required to dim the light, it is not necessary for him to cut down the illumination to the same degree as is necessary with an ordinary reflector.

In order to conform to anti-glare laws in various states, the lamp is set at an angle with the horizontal such that its axis is inclined 3:100 to the horizontal. This inclines the beam of light forwardly, and at a distance of 75 ft. from the lamp, the intensity of illumination at a height of 42 in. above the ground level is not at all objectionable.

Provisions have been made for adjusting the bulb in the lamp. The stem of the socket is held in the rear of the lamp by means of a set screw, and when this has been released, the socket can be moved forward or back and can also be rotated on its axis, which has been found to be of great advantage, as the filament does not always lie in the axis of the bulb.

In his experiments Mr. Roffy has found that what he calls the critical angle for metal reflectors is 52½ deg. That is to say, if a metal reflector is made to embrace a greater angle of light than this, the result is reduced visibility at a distance.

Tests made by the Electrical Testing Laboratory, New York, with a Roffy 7½-in. reflector lamp containing a 28-candlepower bulb with frosted tip showed 130,000 apparent candlepower in the axis of the lamp 100 ft. away and 150,000 apparent candlepower at 1 ft. to the left of the axis 100 ft. away. In the median vertical plane 1 deg. of arc below the level of the lamp it showed 2100 a.c.p. at a distance of 100 ft., and 4 deg. of arc to the left of this plane and 1 deg. of arc above this level it showed 800 c.p.

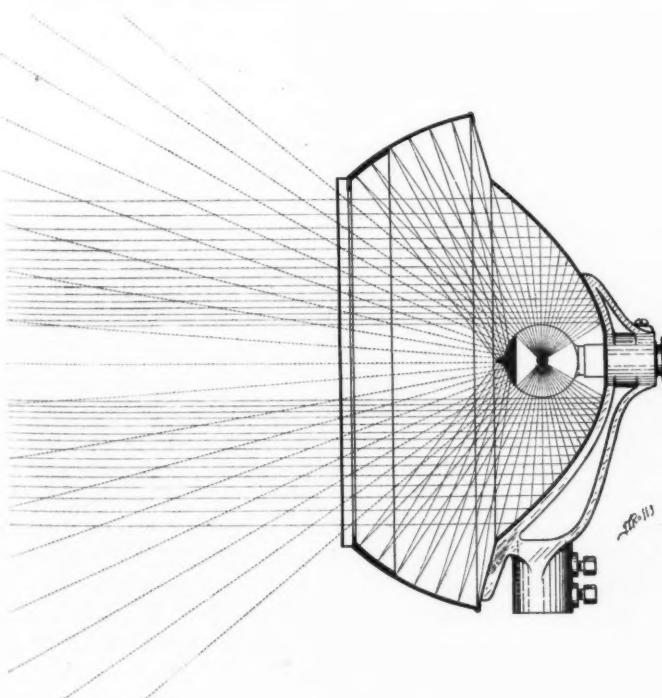
Water Pump Drive in Liberty Engine

A VERY evident error occurred in the description in AUTOMOTIVE INDUSTRIES of the manner of driving the water pump on the Liberty aircraft engine. The paragraph in question occurred at the bottom of page 994 and read as follows: "The water pump is driven from a vertical shaft which takes its drive from the same vertical shaft that drives the cam-shaft driveshaft and the generator. This shaft extends downward and has a bevel gear which meshes with a bevel gear on the end of the pump shaft, thus accomplishing the drive."

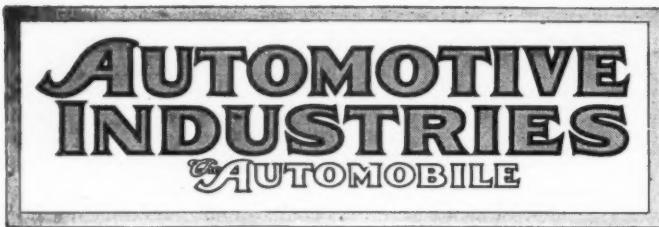
This is evidently an error, since the cam-shaft driveshaft extends upward and not downward, and the passage should read as follows: The water pump is driven from the water pump bevel driver. The bevel driver has two bevel gears on an integral spool mounting. The upper gear takes its drive from the crankshaft bevel gear and the lower meshes with the gear on the end of the water pump shaft. An inspection of the drawing on the insert opposite page 992 will readily explain the drive of the water pump and oil pump.

Automobile Most Prosperous German Industry

IN an article in the *Frankfurter Zeitung*, dealing with the war boom of the German automobile industry, it is stated that the latter has been more prosperous during the period of the war than any other German industry. Throughout the war the demand for automobiles and gasoline engines ran ahead of the supply, numerous additions to plants were made, and the investment of new capital has been much in request.



Sectional diagram of Roffy headlamp



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A. B. Swetland, General Manager
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Pay Informal Contracts Immediately

IF Congress would devote its energies toward quickly passing a bill for the payment of informal contracts instead of becoming hysterical over a reported labor surplus it would quickly balance labor and capital conditions.

For several months the Treasury Department has refused to pay holders of informal war contracts—those contracts made via telephone, telegraph or verbally and therefore not legally executed. For several weeks the House debated bills authorizing payment of these contracts. Finally it passed the Dent bill.

Since that time three additional bills have been presented amidst delay, procrastination, argument and discussion—wasting valuable time, hindering the War Department, the Treasury and particularly manufacturers throughout the country.

Manufacturers in Michigan and Ohio holding

\$300,000,000 worth of war contracts not legally executed are becoming impatient, and rightly so. Their bankers are anxious and they have had to lay off workers while awaiting adjustment.

Very recently there has been much talk about "too rapid demobilization" by Congressmen stimulated by labor organizations. They point to the growing surplus of labor in Detroit and Toledo.

Less talk about labor surplus and more action toward just payment to the manufacturers is what is needed. Give the employers their money and they will quickly absorb any labor surplus.

The bill now before the Senate Military Affairs Committee drawn by the War Industries Board and approved by the U. S. Chamber of Commerce, the Motor and Accessory Manufacturers' Association and other industries appears to include all the necessary features.

This bill or some other equally equitable should be passed at once.

Tractor Service

IT is a well-known fact that tractors require a comparatively large amount of service from the dealer if they are to give satisfaction and "stay sold." The tractor is a recent development and its details have not yet been worked out to the same nicety as those of the automobile, for instance. Moreover, tractor work is very severe, the engine running under nearly full load all the time and all parts being stressed to a high degree. The majority of tractors burn kerosene and the use of this fuel involves greater difficulties than that of gasoline and is the cause of considerable trouble, especially to operators unfamiliar with it.

Not only does the tractor require a considerable amount of service, but this service is of a kind that is rather expensive. It has to be given on the farm and very often in the field. Most of the calls upon the dealers or service men will be made during certain very busy seasons and will have to be responded to at once in order to satisfy the customer. Delay in furnishing a necessary part or remedying some fault interfering with the use of the tractor means a serious loss to the farmer and is very apt to make him dissatisfied.

So far tractor service has been only very poorly organized. Several large makers in the past have had a few traveling experts each covering a large territory, but this method has proven entirely inadequate. The service must be rendered by the dealer who is always nearby.

This brings us to the question as to how service is to be paid for, which is one that is worrying the tractor trade a good deal just now. The farmer expects more or less free service, because he figures that if he cannot make the tractor go there must be something wrong with it and it is "up to" the manufacturer or the latter's representative to "make good." The dealer feels that with current rates of discount he cannot give much in the way of free service. He has his organization to maintain and his establishment to keep up, and after all neces-

sary expenses are deducted there remains only a trifling profit. He realizes that service is necessary to keep the tractor at work and that the farmer expects him to give much of this service free of charge, yet he feels that he cannot give such service and still earn a reasonable profit.

The service situation would seem to afford an excellent opportunity to the Tractor Manufacturers or the Implement Manufacturers' Association to standardize practice regarding this matter. Without some standardized rule it will not be long before one manufacturer is played off against another and there will be keen rivalry among them in regard to the amount of free service promised. The logical solution of the problem would seem to be to discontinue all free service. The farmer must pay for the service in any case, so why shouldn't he pay in accordance with the amount of service he requires? So-called free service is apt to render him careless and unreasonable in his demands on the dealer's time. If he knows that he has to pay for every trip made by the dealer on his behalf he is likely, when something doesn't work right, to cudgel his brain before calling for help, but if he is given the impression that free service is included in the sales price, why shouldn't he take advantage of it?

For the growth and success of the tractor industry it is necessary that adequate service facilities be provided, but it is not by any means necessary that service be furnished free of charge.

Readjustment of Values

THE automobile industry evidently is feeling its way slowly through the uncertain period of readjustment. What we are passing through is really a period of changing values. Although it is quite certain in which direction the adjustment of values will proceed, no one can tell how far it will go and when it will be over.

All business planning is based upon an intelligent forecast of conditions of supply and demand, which regulate prices, and it has seldom been so difficult to make such forecasts as it is now. There has been much talk of "war prices" and "adjustment to peace conditions" and buyers naturally assume a waiting attitude. No dealer will load up with stock in a receding market and the ultimate consumer also is prone to hold aloof as long as there is a chance for a further drop.

There are indications, however, that those who are waiting for a big slump are doomed to disappointment. The present situation has nothing in common with a business depression following a financial panic. Stock quotations may tumble over night, the reason for such disastrous slumps usually being that the values at which the stocks were being held and sold were not in them. Practically all the value in industrial products represents labor spent upon them. The price which must be obtained for articles of manufacture depends upon their manufacturing cost and this in turn depends upon the cost of labor. It is quite true that the cost of labor has gone up very much during the war, and there

is no doubt that eventually it will come down again. This adjustment, however, can be only very gradual, as the cost of living is bound to remain high for some time, and probably for years.

Meanwhile business must go on. Certain risks connected with the possibility of depreciation of materials must be willingly incurred, as they are of little importance compared with the great losses that would result from the stagnation of the industries. There is no ground for a pessimistic feeling. The present situation did not come unexpectedly. We all realized long before the war came to an end that the period of readjustment would bring with it certain disturbances in our commercial life; but just as certain as was the advent of these disturbances is the fact that once we become attuned to the new condition of things we will enter upon a period of great industrial activity and prosperity. A country that can produce 20,000,000 tons of foodstuffs a year in excess of its own requirements, besides large surpluses of staples, metals, fuels and chemicals, need never lack prosperity for any extended period.

Commercial Airplanes

ALTHOUGH little is being heard on the subject, a large amount of feverish activity is being developed in different parts of the country, particularly in Detroit, Cleveland and Dayton, in the low-priced airplane field. There are a large number of able men who have pinned their faith on the early arrival of the commercial airplane. These men have not only expressed an opinion but have staked their futures on the development.

The announcement of a prominent motor car company to the effect that it will have a production airplane to sell at \$15,000, to be marketed through its dealers, is the first step in the direction of what may become a very important branch of the automotive business. The future plane will sell for less than \$15,000, however, and it will not be until planes sell for \$1500 that they will really be considered a commercial product.

The wings of the future plane will be removable or folding so that the entire machine can be packed in small space and put in a garage back of the house in the same way that the automobile is now kept. It must have a landing speed of not more than 45 miles per hour and probably not more than 35 miles per hour. Its engine must be simple, easily taken care of and of inexpensive manufacture. At first thought the idea of a low-priced airplane engine seems rather far-fetched, but there are developments in this direction which have already made successful runs. In the not distant future there will be airplane engines which can be manufactured for a few hundred dollars.

The next two years will see developments along lines which the war never suggested, because the planes required for military service were so different. Nevertheless, these light, low-priced yet well-built and safe little planes are surely going to be the next transportation development.

□ Latest News of the

Draw New Bill to Validate "Informal" Contracts

Measure Prepared by War Industries Board Has Support of M. A. M. A. and the Industry in General—Provides for Appeals Commission—Prompt Action Urged

WASHINGTON, Jan. 21—The Senate Military Affairs Committee to-day reported out a bill for the payment of informal contracts. Early passage is expected. The bill reported is the one drawn up by the War Industries Board and is supported by the United States Chamber of Commerce, the Motor and Accessory Manufacturers Association and industries generally.

As printed herewith, the bill for the payment of informal contracts reported by the Senate Military Affairs Committee with an amendment differs radically from the original bill proposed by the War Industries Board and approved by the United States Chamber of Commerce, the Motor and Accessories Manufacturers' Association and other industrial bodies.

The new bill includes a section by which for the first time in the history of the United States Government one department is authorized to investigate every act of another department. The Department of Justice is authorized by the bill to examine and investigate all of the contracts which have been made by the War Department. This is an objectionable feature in the bill because it is expected to considerably delay payments.

The bill also contains a new amendment authorizing the Secretary of the Interior to pay contracts not legally executed and others which call for the production or appropriation of ores, metals, minerals and mineral substances needed for war purposes.

It is expected that this bill, with the amendment, will be discussed on the floor of the Senate to-morrow. Considerable delay is again anticipated before passage of a relieving measure, due to the constant additional amendments and changes which are being made in each bill offered. The various industrial bodies fear that unless an equitable bill is passed, and passed promptly, there will be serious business difficulties, critical labor conditions and important obstacles to the success of the next Liberty Loan resulting. Following is the bill:

AN ACT

To provide relief where formal contracts have not been made in the manner required by law.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That whenever during the war emergency and prior to Nov. 12, 1918, any individual, firm, company, corporation, or foreign government has made an agreement with the Secretary of War,

or with any officer or agent acting under his authority, or with any agency of the Government authorized to procure or aid in procuring the same for the War Department, for the production, manufacture, sale, acquisition or control of equipment, materials or supplies, or for services, or for facilities, or other purposes connected with the prosecution of the war, and such agreement was reduced to the form of a contract or accepted procurement order and executed or signed on behalf of the Government, but the agreement did not comply with statutory requirements, in every such case the Secretary of War is authorized and directed to waive, on behalf of the Government, such non-compliance: Provided, That he finds such waiver is not inconsistent with the public interest, and in this event the said agreement shall have the same validity and effect it would have had if such statutory requirement had been complied with.

That whenever, prior to said Nov. 12, 1918, any individual, firm, company, corporation, or foreign Government has made any agreement, oral or written, express or implied, with, or has received any order or request, oral or written, from the Secretary of War or any officer, agent, or agency as aforesaid, for any of the purposes aforesaid, and the same has not been reduced to contract form, but such individual, firm, company, corporation, or foreign Government has in good faith made expenditures, incurred obligations, acquired or furnished facilities, equipment, materials, or supplies, or rendered services, in reliance on such agreement, order, or request, in every such case the Secretary of War is authorized and directed, on behalf of the Government, to enter into such contract with such individual, firm, company, corporation, or foreign Government as will, under all the circumstances, fairly and equitably compensate him or it for the expenditures made, obligations incurred, equipment, materials, or supplies furnished or acquired, or services rendered, as aforesaid: Provided, That in no event shall such contract provide for compensation on terms more favorable than the terms, if any,

More Room for Airplane Show; Dates Now March 1-15

NEW YORK, Jan. 21—The aeronautical show which is to be staged by the Manufacturers' Aircraft Association has been considerably enlarged in scope, and the time of the exhibition extended from one to two weeks. Due to inability to get Madison Square Garden for the original dates, the time for the show has been altered from Feb. 26-March 6, to March 1-15. Because of the extent of the exhibits which the military and naval air services wished to have on view, it has been found necessary to use the Sixty-ninth Regiment Armory in addition to the Garden. No allotment of space has been made as yet, though it is expected that these details will all be worked out within the next few days. It is likely that the admission charge will be 50 cents.

for which the aforesaid agreement, order, or request may have provided.

That whenever, prior to said Nov. 12, 1918, the War Department, through its officers or agents, has taken possession of any land, or whenever the holder or owner of any land has removed from or removed any improvements from such land at the order or request of the War Department and no valid contract has been made with respect thereto, then the Secretary of War, if he finds that the public interest does not require the possession or occupancy of such land by the Government, is authorized to make compensation to the owner or holder thereof for the fair value of such improvements so removed and the expense incurred by such owner in removing therefrom or for the fair value of the use of such land of which the War Department has taken actual possession and for any expense or loss incurred by the owner or holder by reason of such possession.

SEC. 2. That a commission is hereby created and established, to be known as the War Contracts Appeals Commission (hereinafter referred to as the commission), which shall be composed of three members, who shall be appointed by the President, by and with the advice and consent of the Senate, and shall continue in office for one year from the date of this Act. One member of the commission shall represent the War Department, one member shall represent the Department of Justice, and one member shall represent the business interests of the country. None of the members of the commission shall be interested in any order, contract, or agreement within the purview of this act or have any interest in any firm or corporation having such orders, contracts, or agreements. Each member of the commission shall receive a salary of \$7,500 a year, payable in the same manner as the salaries of judges of the courts of the United States. The commission shall choose a chairman from its own membership and may appoint a secretary, who shall receive a salary not exceeding \$5,000 a year, to be determined by the commission and payable in the same manner as the salaries of the members of the commission.

That there is hereby appropriated, for the purpose of defraying the reasonable expenses of the commission, including the payment of salaries herein authorized, out of any money in the Treasury of the United States not otherwise appropriated, available immediately and until expended, the sum of \$50,000.

That within thirty days of the date when the Secretary of War tenders any contract or compensation as provided in this act, or refuses to tender such contract or compensation, the party to whom said contract or compensation is tendered or refused, or the Government by a duly authorized officer from the Department of Justice may file with the chairman of the commission a notice of appeal: Provided, however, That if the representative of the Department of Justice agrees with the action of the War Department there shall be no appeal by the Government, but settlement can be made at once. Thereupon, the commission shall proceed to examine and review the facts and circumstances of the case and make its award or finding thereon. Upon giving receipt in full of all demands against the United States arising out of the transaction by reason of which the award is made, the appellant shall be entitled to receive the amount of any award so made, and the proper officer of the United States is hereby authorized and directed to pay the same, but if the appellant is dissatisfied with the amount so awarded he shall be paid 75 per centum of the amount awarded and shall be entitled to sue the United States in the Court of Claims to recover such further sum as added to said 75 per centum shall make up such amount as will be fair and just compensation as provided in this act, and the Court of Claims is hereby given jurisdiction to hear said suit and render judgment therein.

That whenever any dispute arises in the matter of the adjustment or settlement, or as the interpretation or application of the terms, of any contract which has been made for any of the purposes set forth in this act, and in the execution of which there has been

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Automotive Industries

Federal Supervision of Supply Sales

Definite Plan Adopted Covering All Sales of Government-Owned Property

WASHINGTON, Jan. 20—Close cooperation between the Government and industry, generally, in the sale of surplus Government supplies is planned by the Director of Sales of the War Department and the War Service Executive Committee of American Industries. The War Service Committee, which was named at the recent meeting of the Chamber of Commerce of the United States, will be consulted in all instances by C. W. Hare, Director of Sales, whenever sales are to be made in a volume that is likely to disturb trade conditions.

The first important sales to be made by the Government are of machine tools. Arrangements for the disposition of machine tools, made following a conference between the industry and the War Department, include plans by which the industry will absorb Government-owned machine tool equipment without serious disarrangement. The following agreement satisfactory to both the War Department and the machine tool industry was drawn up and will be followed:

The inventory of all machine tools and equipment which is being made will be expedited to the greatest possible extent.

As soon as it is known that a quantity of machine tools is available for disposal, the manufacturers of these tools will be given an opportunity to purchase them at a price and on terms of settlement which will be satisfactory to all parties concerned.

In case it is impossible for the manufacturer to purchase his product outright, an effort will be made to arrange for the marketing of the product by the manufacturer, in an equitable manner, securing for the Government and the manufacturer alike the best possible terms.

In case both these methods of disposition fail, the material will be offered for sale to the general public in a manner prescribed by law.

In settlement of plant contracts, which involve the sale of large groups of various kinds of tools and equipment, an effort will be made to prevent the sale for resale of any equipment, as it is realized that considerable injury might be done by indiscriminate sales of this character.

New Plans for Lincoln Motors

DETROIT, Jan. 20—A well-defined and semi-authentic report current of late in automotive circles is that the Lincoln Motors Co. plant is being prepared for the manufacture of an 8-cylinder motor car. It is known that an experimental car has been on the road, but it is stated on good authority that this design has been superseded. It is understood that engineers are working on engine plans and that a set of blueprints has already been completed. The plant had a \$60,-

000,000 contract for 16,000 Liberty engines. This contract, partly filled, was superseded recently by another contract, cutting production to a minimum, which will bring operations almost to a standstill in the course of the next few weeks.

Apperson New Standard Model

KOKOMO, IND., Jan. 20—The Apperson Bros. Automobile Co. has brought out a new model which is to be known as its Standard model and which is to sell for \$2,600. This is in addition to the Anniversary model, which sells for \$4,000. The Standard model is equipped with the regular Apperson 8-cylinder engine, has a 130-in. wheelbase and will carry seven-passenger touring and four-passenger bodies. It is finished in thistle green.

Ford Now Making 1000 a Day

DETROIT, Jan. 20—The Ford Motor Car Co. is now producing 1000 cars daily, but before it can commence upon its 1919 production schedule, which calls for 3000 cars a day, over \$1,000,000 worth of machinery, installed for war work, must be removed, replaced or scrapped, and several buildings readjusted to handle peace instead of war production. The big plant is working night and day on reconstruction work, but officials assert it will be 90 days before production can regain its pre-war level.

The Ford fiscal year ends July 1. Because of delay caused by the necessity of re-adjustment, the company does not expect to make more than 300,000 cars between January and July. The fiscal year of 1919-1920, they predict, however, will see production reach \$1,250,000. The company has enough orders ahead to keep the plant in operation nearly two years.

Drop in Gasoline Price Expected

WASHINGTON, Jan. 22—A considerable drop in the price of gasoline is expected in the near future as a result of the United States Shipping Board's action in turning back 145 tankers which had been commandeered for war purposes and which are now returned to their owners. The majority of these vessels will be employed soon to transport oil to this country from Mexican fields. The total dead weight tonnage of the ships returned to their owners is 1,140,000.

Beecroft Now Due Feb. 1

NEW YORK, Jan. 23—Due to a hold-up in the sailing of the steamer Adriatic, the vessel will not reach New York until Feb. 1. Hence, David Beecroft, directing editor of the Class Journal Co., who was scheduled to arrive Jan. 27, will reach New York until a week later.

Deeds Is Completely Exonerated

War Department Board of Inquiry Finds Him Not Guilty of Court-Martial Offense

WASHINGTON, Jan. 16—Complete exoneration of Col. E. A. Deeds, head of the Dayton Electric Laboratories Co., and a member of the U. S. Air Service, has resulted from an investigation by a special War Department Board of Inquiry. Col. Deeds was recommended for trial by court martial by Charles E. Hughes in his report on aircraft production, which charges that Col. Deeds had given out misleading information with regard to production. Secretary Baker announced yesterday that he approved the findings of the Board of Inquiry and the case is completely closed.

The findings of the Judge Advocate General were submitted together with a letter by Secretary of War Newton D. Baker to the Chairman of the Committee on Military Affairs of the House. Secretary Baker's letter states that Col. Deeds, absorbed in the activities of aircraft production, neglected to attend to personal transactions and this neglect created appearances which these findings show in their true character.

The findings deal completely with all of the correspondence relative to the charges against Col. Deeds and include letters and telegrams showing that Col. Deeds was reluctant to accept a Government position because of his airplane interests, but that he did so at the urgent request of both Howard E. Coffin and the Secretary of War. Perusal of all of the telegrams which passed between Col. Deeds and the Dayton companies shows, it is said in the findings, that the colonel "zealously tried to protect the best interests of the Government." "It must be remembered," says the findings, "that at the time Mr. Deeds received his commission he was in Washington and not in Dayton where his business interests were located, and he could not reasonably have been expected to attend to the details of the stock transfers himself and did not attempt to do so."

With regard to the accusation that Col. Deeds uttered exaggerated public statements about aircraft production last spring, it is shown in the testimony that although the colonel testified that he had seen the publicity prior to its publication, he had actually not seen those parts which contained the erroneous statements. Regarding this matter the Judge Advocate General states: "It is recommended that no court-martial proceed-

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Ships, Credit, Cables for Brazil Trade

These Are the Things Principally Needed to Develop Trade with America

WASHINGTON, Jan. 17—The establishment of American banks, long credit, fast passenger and freight service, independent cables, and the development of port and harbor facilities in Brazil by American capital are recommendations among others made by Capt. C. T. Vogelgesang of the U. S. Navy in a special report to the Secretary of the Navy. Capt. Vogelgesang went to Brazil to study the measures that will cement relations between that country and the United States. His report includes the following:

"Brazil desires a closer relationship with the United States. They want more American banks run according to the United States banking system. They want our credit and our capitalists to extend it to them in unstinted measures, for supporting that credit Brazil can offer an incomparable wealth of resources.

"But first of all, and above all, we need direct communications. Few people are awake to the value, the actual indispensability of direct communication between peoples who are trying to do business with each other, and the overwhelming disadvantages that underlie indirect and intermittent communication.

"As important as is the need of using our own carriers to dispense our goods throughout the world, it is of equal importance that we should link up our own cables to those countries with which we seek to do business, instead of having to depend, as we do now, upon the use of foreign cables, which, while not perhaps owned by foreign governments, are certainly administered in the interest of the nationality owning them to the detriment of alien clients and alien business.

"We cannot achieve economic freedom or count upon fair play in the game of international trade so long as we are tied down to a system of doing business through foreign banks and over foreign cables. In this connection it is interesting to speculate upon the possibilities of aerial mail communication from the United States to South America. Although but a few months have elapsed since this method of communication has been tried in the United States, it has already passed the experimental stage and is an unqualified commercial success. It will take no stretch of imagination, with this fact in mind, to see within a short time an aerial mail service connecting Washington or New York with Rio de Janeiro.

"The United States radio service, while it can never supplant cable service, will unquestionably supplement that service and become a most valuable commercial asset.

"In the development of a closer relationship we Americans may be assured that Brazil will do her part if we will do our part. The problem is for us to solve, because it takes capital to solve it. We have the capital and Brazil has not. We have her abundant good will and confidence and we can maintain that unimpaired by square dealing.

"The lines along which our capital may be best employed are the following in their order of importance as I view the situation:

"1. An independent American cable direct from New York to South America.

"2. More American banks and long credit.

"3. Fast passenger and freight steamer lines to Brazil, run on fast and regular schedules, and strictly first class in every particular.

"4. Development of Brazilian railways. Brazil's need of railways is as great as the need of China in that respect.

"5. Development of port and harbor facilities and coastwise commerce.

"6. Development of mining regions con-

taining illimitable wealth of ores of all kinds.

"7. Development of industrial plants for the manufacture of material needed locally and for which raw material and water power exist in abundance and for which skilled labor will have to be supplied.

"The field is at this time wide open to energy and enterprise, and if United States capital, backed by a strong and enduring policy of Government support does not avail itself of the golden opportunity that is now presented, foreign capital will control, and we will not have established that community of interest that Brazil looks for in her relations with us."

Philippine Imports Limited by Amounts Obtainable

WASHINGTON, Jan. 20—Imports of automobiles and parts in the Philippine Islands in 1917 were limited by the amount obtainable, according to a Commerce Report made public here to-day. Cars totalled 1,540,401 as compared with 1,352,572 in 1916. The year 1917, adds the report, brought the foreign commerce of the Philippine Islands to its high-water mark, and developed the internal trade to a maximum. The growth of business in the islands is founded upon the staple production of the country. Agricultural, commercial and industrial pursuits have increased several hundred per cent in the past few years. Trade has grown particularly with Japan and China, while it has declined with Great Britain, France, the Netherlands, Italy and Switzerland. It has increased more than 72 per cent in the past year with the United States. The hemp industry retains its leading position, although exports of sugar, tobacco, lumber, pearl and cocoanut oil have increased promisingly. A lack of shipping facilities has been one of the greatest obstacles to a still greater import and export business.

Exports to Mexico Simplified

WASHINGTON, Jan. 18—Applications for export licenses to Mexico are no longer required to have attached thereto an order from the consignee bearing the visé of an American consul. The War Trade Board announced Jan. 16 that such procedure in connection with shipments to Mexico is no longer required.

This simplification will expedite shipments to Mexico by enabling the shipper to get his license more quickly, and will result in getting exports under way without the delay incidental to the procedure of awaiting consular communication.

Manganese Import Restrictions Lifted

WASHINGTON, Jan. 18—Restrictions on the importation of manganese ore or manganese dioxide from Asia and Australasia, and upon the importation of chrome ore or chromite, or copper ore and copper concentrates from any country are lifted completely by the War Trade Board. All restrictions on the importation of iron ore are removed. Applications for the importation of ferromanganese from Great Britain covering shipments contracted for by American consumers prior to April 6, 1917, will now be allowed. The affidavit of the importer, or written statement from the consumer, of the existence of the contract will be considered sufficient.

Belgium Is Ready for Business

Minerva, Pipe and F. N. Have Plans Made—To Produce in Few Months

PARIS, Jan. 1 (Special Correspondence)—The Belgian automobile industry has already laid its plans for a return to working conditions. Three of the leading factories, Minerva at Antwerp, Pipe at Brussels and F. N. at Liege, hope to get into production within a few months. The Metallurgique company at Marchienne-au-Pont states that it has machinery in storage ready to be shipped and installed, and that production will begin at very short notice.

The Belgian Government has decided to divide among the leading Belgian automobile manufacturers 5000 army trucks and automobiles, and also to distribute among them all the automobiles, motorcycles and bicycles captured from the German army. A portion of the army supply of machine tools and factory equipment will be distributed among the automobile factories. It is intended to distribute raw material in the same manner.

All the Belgian automobile factories have been stripped by the enemy. In some cases the machinery was sent directly into Germany; in other cases the enemy waited until it was evident that Belgium would have to be evacuated before removing everything.

Before the war Belgium had twenty-three automobile factories and produced about 10,000 cars a year. Very few trucks were built. There was only one tire factory—the Englebert, at Liege. In 1914 the German army took charge of this and turned it over to Engineer Tischbein of the Continental Tire & Rubber Co., of Hanover. The Germans immediately requisitioned one million dollars' worth of tires and raw material, and a little later seized most of the machinery. The factory was kept going on a small scale for the last 3 years of the war making waterproof clothing for the civilian population.

High Import Duty and Gas Price in Way of South American Business

BUENOS AIRES, Dec. 5 (By Mail)—The price of the gasoline said to be on hand, and the high rate of duty probable on motor importations, it is feared may limit the South American import business. It is claimed that there is still four to six months' supply of gasoline here, although there are no definite proofs either affirmatively or to the contrary. The price has not been raised recently, but the charge at the pumps in this city is 38 cents per liter, or about 62 cents per gallon, while all through the interior they are paying practically double this price, and in some instances even three times. The restrictions on purchasing are many, and there is a great deal of speculation.

A law is now proposed to raise the duty on motor cars and accessories. While this law has not been acted on as yet, the general opinion is that it cannot fail to pass, and will be in effect in a very few months. Up to February, 1918, motor cars and accessories paid a duty of 10 per cent on their value. From February to the present date they have paid 32 per cent. Now it is proposed that the duty shall be raised again so that they will pay 47 per cent in 1919. This will undoubtedly cause a serious decrease in importations, as the price to the public will be almost prohibitive.

Opportunity For South African Export

WASHINGTON, Jan. 20—Shortage of shipping and the difficulties of obtaining cargo space hampered the automobile trade of Johannesburg, British South Africa, according to a report by the vice consul, during 1917, but notwithstanding, business was fairly well maintained.

This is important from the viewpoint of the American manufacturer, for South Africa has now become an outlet of consequence for this export trade.

The gross value of the imports of motor vehicles, accessories, tires, gasoline, etc., increased from \$8,594,200, in 1916, to \$9,948,080, in 1917, or about 15% per cent. However, the advanced prices of all these goods indicate a higher aggregate cost rather than a larger volume of business. Imports from the United States amounted to \$5,279,943, or 53 per cent of the total; and the United Kingdom furnished \$1,372,639, or 19 per cent. In 1916 the percentages were as follows: United States, 55 per cent; United Kingdom, 24 per cent; and other countries, 21 per cent.

The average declared value of the English automobile amounted to \$1,144, while the approximate value for custom purposes of the American and Canadian car was \$779 and \$438, respectively. The latter has grown greatly in popularity in recent years, and imports from Canada rose 71 per cent, compared with those for 1916. On the other hand, imports of automobiles from the United Kingdom decreased 45 per cent, or from \$325,218 to \$178,805; and the figures for the United States fell from \$2,717,051 to \$2,525,881 for the same period.

A decrease of 16 per cent was noted in the gross value of motorcycles and parts imported into this district in 1917, compared with the preceding year. The United Kingdom lost its supremacy in this market to the United States, imports from which were valued at \$352,865, or 53 per cent of the total.

Tires were supplied to the value of \$1,374,227 by the United Kingdom, which still continued to be the principal source of supply with 53 per cent of the total imports to its credit. Imports from the United States increased from \$692,114, in 1916, to \$705,681, in 1917, and a material gain resulted to French and Italian manufacturers, imports of their goods increasing by 71 per cent compared with the figures for 1916.

The motor trade of the Union has now reached such a stable state that it is capable of absorbing annually imports of considerable value. It will no doubt grow in volume and importance because the isolation of certain districts cannot be eliminated altogether by railroads. Heretofore, railway facilities have been practically the only means of communication between distant settlements, and regular motor traffic would tend greatly to hasten the industrial development of districts whose progress has been retarded in the past.

Foreign Trade Opportunities

WASHINGTON, Jan. 20—A man in France desires an agency for motor car bodies, trimmings, etc. Further information can be secured from the Bureau of Foreign and Domestic Commerce by mentioning Foreign Trade Opportunity No. 28087. A firm of Chinese merchants in Trinidad desires an agency for the sale of motor cars and rubber tires. No. 28095.

November Exports from New York

Satisfactory Increases in Cars and Trucks—Parts Drop Nearly 60 Per Cent

NEW YORK, Jan. 21—November exports of automotive products from this port are much more satisfactory than might be expected. There is no doubt but that the switching of a large number of ocean-going ships for service in transporting the foodstuffs still needed in great quantities overseas has tied up our commercial shipping to a very great extent, but, nevertheless, our exports of cars during the month totalled 806, valued at \$1,003,416, as against 557, having a value of \$735,558, during October.

Our November exports of trucks were 549, valued at \$1,733,489, as against 328, valued at \$1,057,003, in October. Parts (excluding engines and tires) show a serious falling off, the November value being but \$593,414 as against October's \$1,473,655. Tires, which appear in this

tabulation for the first time, represent a normal month's export trade.

In the order named, the principal buyers of passenger cars during November were British South Africa, Uruguay and Japan. France was by far the best customer for trucks, Japan taking second place. During November there were also exported from New York alone 181 motorcycles, valued at \$46,050, and 35 gasoline automobile engines, having a value of \$3,242.

Garages to Secure Ford Parts from Dealers

DETROIT, Jan. 20—The Ford Motor Co. is handling the selling of Ford parts to garages through its authorized dealers, and not through the factory. Announcement of the plan of the Ford Motor Co. to sell its parts directly to garages has created a number of inquiries and orders to the factory and factory branches direct. The company, however, states that it prefers that the sale of Ford parts to garages be handled through its regular authorized dealers, instead of being shipped direct from the nearest branch.

AUTOMOBILE, TRUCK, PARTS AND TIRE EXPORTS FROM NEW YORK FOR NOVEMBER

	Cars		Trucks		Parts Value	Tires Value
	No.	Value	No.	Value		
Aden					\$6	
Argentina	21	\$22,285	..	..	32,965	\$154,904
Australia					15,278	
Azores Is.					1,600	
Barbadoes			1	\$3,000	753	4,043
Bolivia	2	5,089			1,004	14,662
Brazil	39	49,761	2	5,467	17,859	40,584
British East Africa	14	14,445	..	..	3,471	165
British East Indies						
British Guiana	3	2,600	1	2,600	7,643	12,546
British India	2	2,688			31,175	5,596
British South Africa	161	158,682	15	20,346	53,039	79,577
British West Africa					2,861	
British West Indies	1	709	1	1,650	103	2,793
Canary Islands					45	
Chile	22	48,116	8	17,700	33,800	85,589
China	2	3,300	6	5,600	3,276	14,711
Colombia	9	10,840	1	405	2,571	3,427
Costa Rica					116	94
Cuba	24	69,468	20	46,469	76,364	162,581
Danish West Indies	2	2,000	..	..	32	488
Denmark	39	52,726	..	..	3,711	
Dutch East Indies	26	34,926	18	26,882	28,963	11,452
Dutch Guiana					180	640
Dutch West Indies					185	328
Ecuador	1	3,000	1	540	654	4,221
England	31	98,003	26	55,297	47,510	38,881
France	2	3,600	311	1,325,016	48,662	102,365
French Africa						
French West Indies	6	4,422	1	1,200	5,387	5,176
Guatemala					577	295
Haiti	2	1,300	..	..	2,068	3,462
Honduras	1	1,300	..	..	629	547
Hongkong						2,360
Iceland						
Italy			5	8,400	29	
Jamaica	1	750			4,033	715
Japan	70	65,099	51	83,527	5,332	4,842
Korea					339	
Madagascar					40	565
Mexico	26	36,798	13	17,706	10,938	57,451
Morocco					1,254	
Newfoundland	15	15,806	..	..	456	716
New Zealand	43	35,275	36	24,719	47,604	
Nicaragua	2	1,550		..	207	373
Norway	17	30,525	21	55,074	38,279	4,396
Panama	2	1,837		..	1,590	13,606
Peru	31	57,081	6	17,481	14,058	29,123
Philippine Islands						
Portugal					6,493	2,014
Portuguese Africa			3	6,000	12	92
Russia in Asia	3	11,734		..		
Salvador	1	1,242		..	657	1,188
Santo Domingo	2	1,818		..	8,602	5,640
Siam					39	
Spain	38	75,467	1	7,210	5,725	
Switzerland						
Trinidad	1	950		..	8,941	17,760
Uruguay	135	64,740	..	..	11,809	
Venezuela	9	13,499	1	1,200	4,290	12,200
Totals	806	\$1,003,416	549	\$1,733,489	\$593,414	\$902,067

Suit Against Jobbers Slow-Moving

First Witness Heard Tells of Operation of So-Called Syndicate Catalogs

NEW YORK, Jan. 20—The trial of twenty-one members of the Jobbers' Association is showing a little more interest and speed this week than it did last week. It opened last week with George Woelfel, Jr., Commissioner Webster's former secretary, on the stand, and the various prosecuting attorneys reading great masses of documentary evidence.

In the opening days the jobbers were quite encouraged when Judge Hand, who is an old timer in the United States District Court here, showed a disposition to speed things up. He repeatedly asked if it were necessary to bring in all the masses of documents that the Government attorneys presented. And when one of them proposed to read some 1400 letters into the record the judge flatly refused to listen to them. He also jogged the defense at times and seemed anxious to get the case over with. Estimates of the period run from a month to six weeks.

The court scene is anything but exciting, and at times the spectators' benches contain only two or three. To-day, however, when things began to liven up, there were twenty-five or thirty spectators.

Most of the evidence during the "literary stages," when documents were being read, seemed to be to establish some of those facts which are well known to the trade, such as the formation of the association, the passage of resolutions and the existence of the "jobbers' list."

To-day, however, real witness' stories were heard. The first on the slate this morning was G. A. Smale, who operates the Catalog System Co. in Wilmette, Ill. He told of the association's resolution which frowns on the use of syndicate catalogs. The substance of his story was that he protested against this resolution to various individuals and at two different meetings, but to no avail. He said also that thereafter quite a long list of former customers declined to take space in his catalogs, giving as an excuse the association's resolution.

The cross examination by the association's counsel tended to show that Smale showed only those goods whose makers paid him money for space, that he did little investigating as to the status of those who bought space and catalogs, that he sold the catalogs, imprinted with the buyer's name, to anyone who would pay for them, that he imprinted on the front cover any copy the buyer supplied, and that this tended to cause many "illegitimates" to secure jobbing rates on merchandise to the general disadvantage of the whole trade.

These catalogs, it was developed, did not contain a complete list of the trade's

goods, but simply a list of the goods of those makers who paid to get in. This fact, however, was not, as a rule, explained to those dealers and jobbers who bought the catalog for use among their trade.

He distributed over 100,000 copies a year to more than 100 customers at from 5 to 10 cents each and charged the manufacturers about \$1.50 per page per thousand. Charles E. Miller was on the stand for a few minutes, but didn't stay long. He may be called again.

And then came Clement M. Biddle of "Biddle's Purchasing Agency." He said his company rendered a service in giving daily price changes and other information and catered to the jobbers in the hardware, iron, steel, plumbing supplies, grocery, metals and automotive equipment trade.

Biddle's story related to the association's resolution to the effect that there is no field in this trade for a purchasing agency, and he endeavored to show that his business is of service and that the resolution is unjust.

Crow-Elkhart Settlement

SOUTH BEND, Jan. 22—At a meeting of the representatives of the Crow-Elkhart Motor Car Co. it was practically decided to accept a settlement of 25 cents on the dollar. This decision is not to go into effect immediately. The total liabilities of the company are \$330,000.

Bruce Daniels Joins Seeds

INDIANAPOLIS, IND., Jan. 20—Bruce Daniels, in charge of advertising for Prest-O-Lite Co., has resigned that position to join the staff of the Russel M. Seeds Co., an advertising agency. For the last eight years he has been closely identified with the motor industry. Originally automobile editor of the Indianapolis *Star*, he has successively been in charge of the Motor Car Manufacturing Co., the Stutz Motor Car Co., and was for the last five years with the Prest-O-Lite Co.

McLaughlin-Buick Price Down

OSHAWA, ONT., Jan. 21—The McLaughlin Motor Car Co., Ltd., of Canada, which is the Canadian representative of the Buick Motor Co., and which assembles and sells the standard Buick models under the name of the McLaughlin-Buick, has reduced car prices as follows:

H-62 Roadster, \$1,500; H-62 Special, \$1,545; H-63 Touring, \$1,500; H-63 Special, \$1,575; H-62 Coupe, \$2,075; H-63 Sedan, \$2,225; H-44 Roadster, \$1,925; H-44 Special, \$2,050; H-44 Extra Special, \$2,090; H-45 Special, \$2,050; H-45 Extra Special, \$2,090; H-46 Coupe, \$2,625; H-49 Seven Passenger, \$2,365. All prices, however, are subject to war tax.

Chicago Office for Warnock-Wirth

SIOUX CITY, Jan. 22—The Warnock-Wirth Sales Co. has located its department of sales at 624 S. Michigan Avenue, Chicago, under the management of C. H. Scribner.

Bosch Magneto Is Reorganized

The American Bosch Magneto Corp. Takes Over Entire Plant of Old Company

NEW YORK, Jan. 23—American Bosch Magneto Corp. is the new name of the entirely reorganized Bosch Magneto Co. which on Dec. 7 was sold by Alien Property Custodian A. Mitchell Palmer. Under the new regime, the Bosch company is 100 per cent American, and has as its officers the following: President, A. T. Murray, president of the Bethlehem Motors Corp.; vice-president and treasurer, George A. MacDonald, president of the Chicopee National Bank, Springfield, Mass.; vice-presidents, A. H. D. Altree and Leon W. Rosenthal; secretary and assistant treasurer, J. A. MacMartin. Directors: Geo. A. MacDonald; A. T. Murray; Martin E. Kern, president of the Penn County Trust Co., Allentown; Henry N. Sweet and H. B. Benedict, of Hornblower & Weeks, bankers; C. H. Dwinell, vice-president First National Bank of Boston; H. C. Dodge, chairman of the board of directors of Gray & Davis; Duncan C. Holmes, vice-president of the Chase Securities Co.; Philip L. Spalding, president of the New England Telephone & Telegraph Co., Boston.

The new company has taken over the entire holdings and property of the old, including the Springfield plant and all American and foreign patents and trademarks under which the old company operated. At the time the plant was sold by the Alien Property Custodian it was operating practically to capacity on government work.

Goodyear Dealer Method Is Legal

NEW YORK, Jan. 23—The method of the Goodyear Tire & Rubber Co. in doing business with its dealers and in refusing to sell to those who will not maintain its resale prices is legal, according to a decision by Judge Hand, rendered late last week. H. P. Baran, a Goodyear dealer, filed suit against the Goodyear Tire & Rubber Co., claiming infringement of the Sherman and Clayton laws.

He alleged that Goodyear conspired to obtain a monopoly and restrain trade and commerce in their tires; that they selected the dealers who should sell their tires, forbade them to sell other dealers, and instructed them to sell only at the prices and terms fixed, under penalty of forfeiting their position as Goodyear dealers.

Counsel for the Goodyear company pointed out that the company's object was to protect the public and insure their getting maximum service from Goodyear products. Judge Hand ruled that the Goodyear method is legal, stating that the selected dealers could do as they pleased with the merchandise, that there was no agreement among dealers to fix prices or restrict sales, and that the principal point at issue was whether the Goodyear company was within its rights in attempting to prevent price-cutting by refusing to sell to dealers who did not maintain the suggested prices. No decision to which he was referred, said Judge Hand, "prevents a single trader from rejecting a customer because he did not like the prices at which the customer resold."

Packard Biplane at \$15,000

Two-Seated Machine to Be Sold Through Dealers—Other Dealers Interested

DETROIT, Jan. 23—The Packard Motor Car Co. is shortly to place on the market a two-seated biplane which is to be sold through Packard dealers at a figure close to \$15,000. The Packard Company, therefore, becomes the first manufacturers of passenger cars and trucks to take up, in a commercial way, the production of airplanes for general use.

The decision of the company to enter this new field is not altogether surprising in view of its experience in the development of an airplane engine of its own and of the intimate relationship between the Packard engineering force and the finished Liberty engine. It was largely through the efforts of Jesse G. Vincent, at that time vice-president of engineering of the Packard Company, that the Liberty engine was designed and brought to perfection.

Machines Ready in 30 to 60 Days

Beyond the fact that the machine is to be a two-seated biplane, little regarding the design and construction has been permitted to become public. It is expected that the first machine will be ready in from thirty to sixty days, and it is planned to supply them to dealers as rapidly as possible. Already the Chicago dealer has ordered one and other dealer organizations see in the machine a potential market composed of well-to-do sportsmen.

That dealers will take readily to the sale of planes, and that they believe in

the possibilities of selling such machines is indicated by the fact that in both Milwaukee and Philadelphia, dealers have recently arranged to handle aircraft. George W. Browne, Milwaukee distributor of Overlands, is to take on the distribution of Curtiss machines, which are made by the Overland interests; and in Philadelphia, Isenberg Brothers have prepared plans and shortly will erect a building to be used for the exhibition and sale of heavier-than-air machines. The company will sell both new and used machines.

Banquet for "Rick" Feb. 3

NEW YORK, Jan. 23—Rickenbacker is coming back. He has already sailed, and in honor of his home-coming, the Contest Board of the American Automobile Association will tender him a monster banquet. It is to be held at the Waldorf-Astoria, New York, Monday, Feb. 3. Associated with the A. A. A. in the arrangements for the dinner are the N. A. C. C., the Automobile Club of America, the S. A. E., the M. A. M. A., the Aero Club of America, the New York Dealers' Association and the Aircraft Manufacturers Association. It is expected that 1000 will attend.

PARIS—Enlisted in the American Army as a first-class sergeant in early 1917, race driver Eddie Rickenbacker will sail for America in a few days with the rank of Captain and Squadron Commander, wearing the red ribbon of the French Legion of Honor, the highest military decoration which can be bestowed by France; with the French Croix de Guerre and three citations, with the American D. S. C. and seven citations, and a record of 26 German planes officially shot down in combat, this constituting the record of the American army.

U. S. Exports More Cars and Trucks

November Figures Show Gain in Vehicles and Drop in Parts

	1918				
	Cars	Value	Trucks	Value	Parts
Nov.	2,226	\$2,576,622	974	\$2,709,362	\$2,166,719
Oct.	1,708	1,881,462	737	2,192,556	3,700,687
					1917
Nov.	5,006	4,820,738	1,496	3,538,077	2,535,230

WASHINGTON, Jan. 22—So much is dependent on the amount of ocean shipping available and the conditions regarding gasoline and tires existing in a number of countries with which in more normal times we have steady and uninterrupted business relations, that it is obvious unfair to compare any one month's exports with those of another.

There is no doubt whatever that there are plenty of orders for automotive products from Europe, Asia, Africa, Australasia and Latin America, but it is equally true that in a greater or lesser degree United States manufacturers still experience difficulties in shipping promptly. It is also obvious that the demand for passenger cars is bound to fall off in countries where gasoline is either rationed or where no fuel at all is available. Happily, these conditions are mending rapidly. The figures given above and those contained in the table herewith are self-explanatory and disclose a satisfactory state when abnormal trading conditions are considered.

Saxon Back to Car Production

DETROIT, Jan. 21—The Saxon Motor Car Corp. is getting back to passenger car production.

Exports of Automotive Equipment for November and Eleven Previous Months

	Month of November			
	1918		1917	
	No.	Value	No.	Value
Airplanes	19	\$189,000	1	\$17,250
Airplane parts		56,900		3,083,275
Commercial cars	974	2,709,362	1,496	3,538,077
Motorcycles	657	165,400	637	136,829
Passenger cars	2,226	2,576,622	5,006	4,820,738
Parts, not including engines and tires		2,166,719		2,535,230
Totals (trucks, cars and parts value only)		\$7,452,703		\$10,894,045

EXPORTS BY COUNTRIES NOVEMBER, 1918

	Passenger Cars	Trucks	
		No.	Value
Argentina	22	\$23,864	.....
Australia	260	228,416	.....
British India	7	8,688	.....
British South Africa	161	158,682	.....
Canada	301	287,115	159
Chile	23	53,176	.....
Cuba	150	213,947	36
Denmark	39	52,726	.....
Dutch East Indies	139	229,856	.....
France	2	3,600	422
Mexico	160	176,596	1,784,870
New Zealand	148	134,755	.....
Norway	17	30,525	.....
Philippine Islands	8	16,017	.....
Russia in Asia	3	11,734	.....
Russia in Europe	38	75,467	.....
Spain	31	98,003	32
United Kingdom	135	64,700	.....
Uruguay	582	708,715	334
Totals	2,226	\$2,576,622	974

Eleven Months Ending November, 1918			
1918		1917	
No.	Value	No.	Value
48	\$607,255	139	\$1,082,957
	4,634,641		14,245,485
9,412	24,178,263	13,672	35,162,355
	2,054,980	13,036	2,741,707
8,731	34,074,635	59,309	46,492,703
	31,415,539		26,672,348
	\$89,668,437		\$108,327,406

ELEVEN MONTHS ENDING NOVEMBER, 1918

ELEVEN MONTHS ENDING NOVEMBER, 1918			
Passenger Cars		Trucks	
No.	Value	No.	Value
1,465	\$1,520,139	43	\$39,863
3,372	3,031,942		.....
64	58,834		.....
1,076	93,661		.....
8,487	7,065,188	1,499	1,892,135
1,605	2,061,598		.....
1,788	2,429,204		.....
71	110,873	507	1,021,986
1,066	1,293,903		.....
999	1,118,928	2,986	11,213,845
1,828	1,429,626		.....
1,355	1,156,986		.....
198	430,514		.....
1,640	1,416,540		.....
3	11,934	15	18,200
10	8,325	2	5,454
761	974,843		.....
422	1,081,347	2,254	6,651,869
1,351	299,787		.....
7,471	7,150,363	2,106	3,334,911
	\$34,074,635	9,412	\$24,178,263

Load Trucks with 3% Tax

Conference Committee Puts the Impost Back, But Lets Farm Tractors Off

WASHINGTON, D. C., Jan. 20—The Conference Committee of the Senate and House of Representatives has put back in the new War Revenue Bill a tax of 3 per cent on commercial vehicles. The action of the committee was not altogether unexpected, for the vote of the Senate in eliminating the 5 per cent tax from the original bill was very close. Thirty-three voted for its elimination, as against twenty-eight for its retention in the measure.

In deciding definitely the tax for the motor trucks, the Conference Committee appears to have been guided by three principal ideas. These are:

1. That motor truck manufacturers were not really limited in their production prior to the signing of the armistice, but instead were permitted to expand considerably;

2. That during this period of only slightly restricted production and expansion, manufacturers made considerable money; and

3. That commercial motor vehicles have done much damage to the public highways, and are continuing to do so.

As the War Revenue Bill stands at present, it includes the tax of 5 per cent on the sales price of passenger cars, motorcycles, tires, spare parts and all accessories (the tax on tires and parts and accessories applies only when sold to other than a manufacturer) and 3 per cent on motor trucks. The proposed tax on farm tractors has been definitely eliminated by the Conference Committee.

Inasmuch as both the Senate and the House of Representatives have agreed upon a tax of 5 per cent on the sale price of passenger cars, it is practically a foregone conclusion that this impost will stand. The Conference Committee, in fact, has no authority to eliminate this tax because of its previous acceptance by the Senate and House.

Certificate Necessary for Norwegian Imports

WASHINGTON, Jan. 18—Exporters shipping to Norway must hereafter obtain advice from the prospective importer in Norway that an appropriate import association or the Norwegian Finance Department has issued a certificate permitting the import of the proposed consignment, before filing application with the War Trade Board here. The certificate must be either issued or confirmed subsequent to May 10, 1918. Inquiries regarding the Norwegian Import Association's regulations and their certificates should be addressed to the Norwegian Legation, Commercial Department, Washington, D. C.

All questions of Norwegian import control or difficulties relating thereto should be set-

ted before filing applications with the War Trade Board.

In filing applications for licenses to ship commodities which are controlled by Norwegian import associations, the application must show as the consignee the association that issued the certificate, and the exporters are also required to state on applications the name of the person or firm in whose favor or on whose behalf the import certificate was issued; as, for example:

Consignee—Oil and Colour Merchants' Association, Christiania, Norway.

Purchaser Abroad—Here state person or firm to whom certificate was issued. Address of such person or firm.

Applications for licenses to export commodities which are not controlled by Norwegian import associations must be covered by a guarantee certified by the Norwegian Finance Department and further certified by an American consul in Norway. Shipments falling within this class may be consigned directly to the importer.

Sixth National Foreign Trade Convention in April

CHICAGO, Jan. 18—The National Foreign Trade Council will hold its sixth National Foreign Trade Convention at the Congress Hotel, on Thursday, Friday and Saturday, April 24, 25 and 26. The convention will deal with foreign trade as a factor in stabilizing American industry. It will take up problems involving the conversion of war industries to the needs of peace; development of our foreign trade to provide employment for our soldiers, sailors and war workers; and the formation of a definite policy dealing with shipping.

N. A. C. C. Meetings During N. Y. Show

NEW YORK, Jan. 20—The National Automobile Chamber of Commerce has two meetings scheduled to be held during the New York show period. The first of these will be devoted to passenger cars and is to be held on Feb. 5; the second will be devoted to commercial vehicles and will be held Feb. 11.

Canada Revises Truck License Fees

TORONTO, Jan. 18—The Canadian Department of Highways has put into effect a new scale of license fees for trucks. The change is a double one, both the fee and the basis for computing it having been revised. In the past 1 and 2-ton trucks have paid \$10. For each additional ton they have paid a fee of \$5. In the future \$10 will be the minimum charge for a truck of 2 tons "combined weight and carrying capacity," which corresponds approximately to a 1-ton truck under the old method. For trucks exceeding 2 tons, weight and carrying capacity, there is a sharp increase. Up to 8 tons the extra fee is \$5 a ton additional as formerly, but the actual amount paid will be increased by the new basis. On trucks of over 8 tons up to 10 tons the rate will be \$7.50 per ton, and on all trucks of over 10 tons, \$10 per ton.

Another change made in license fees makes the rate for the dealer's license and markers \$20, the dealer having the right to use the markers on any car in his establishment apart from cars used for hire. This does away with the system that allowed a dealer to pay \$10 for the license and original markers and \$5 for each extra set of markers. That system was discontinued because of misuse of the extra markers.

Continue 9 Standard Tire Sizes

Rubber Association at Annual Meeting Decides Not to Revert to Former Schedules

NEW YORK, Jan. 17—The nine standard sizes of pneumatic tires which were evolved by the War Service Committee of the Rubber Association of America in conjunction with the Society of Automotive Engineers are to be continued. This was decided at the annual meeting of the Rubber association held at the Waldorf yesterday.

These nine sizes include both plain and non-skid treads in the following dimensions, all being straight-side type except the two smallest, which are clincher: 30 x 3 1/2, 31 x 4, 32 x 3 1/2, 33 x 4, 34 x 4 1/2, 35 x 5 for passenger cars, and 36 x 6, 38 x 7 and 40 x 8 for commercial vehicles.

These are the sizes which the industry decided it could get along with during the war, eliminating all other of the 287 sizes which heretofore have been made. Now that the war is over, it has been decided that the benefits of standardizing on these sizes may well be perpetuated.

Nothing has been done as yet with regard to the continuation of the standard sizes of solid tires adopted soon after the pneumatic sizes were decided upon. This is a matter which is to be taken up at a later date. It was the consensus of opinion of the meeting that the solid tire standards be continued, though there may be some slight change in one or two of the sizes.

Prior to the meeting at which this action was taken the War Service Committee was formally disbanded, and to the Pneumatic Tire Division of the association there has been added a solid tire division, which is headed by A. G. Partidge, sales manager of the Firestone Tire & Rubber Co.

Homer E. Sawyer, vice-president in charge of the footwear division of the U. S. Rubber Co., was elected president of the association, other officers elected being: First vice-president, Harry T. Dunn (Fisk Rubber Co.); second vice-president, F. A. Seiberling (Goodyear Tire & Rubber Co.); secretary and treasurer, Harry S. Vorhis. Seven new directors were elected as follows: John F. Lowman (Philadelphia Rubber Works Co.), Seneca G. Lewis (Pennsylvania Rubber Co.), James Newton Gunn (U. S. Rubber Co.), C. W. McLaughlin (Mohawk Rubber Co.), John Morgan (McGraw Tire & Rubber Co.), G. W. Henne (Mansfield Tire & Rubber Co.), A. D. Thornton (Canadian Consolidated Rubber Co.).

Would Appropriate \$600,000,000 for Roads

WASHINGTON, Jan. 18—The Senate Committee on Post Offices and Post Roads is considering an amendment to the rural post roads bill of 1916 which will appropriate \$600,000,000 between

1919 and 1924 for development of the rural post roads. The amendment was offered by Senator Bankhead and calls for appropriations of \$50,000,000 immediately, \$75,000,000 July 1, 1919, \$75,000,000 July 1, 1920, \$100,000,000 July 1, 1921, \$100,000,000 July 1, 1922, \$100,000,000 July 1, 1923, and \$100,000,000 July 1, 1924, to be used in the construction of highways under House Bill 7617, which was passed in July, 1916. This bill authorizes the Secretary of Agriculture to co-operate with the various state highway departments in the construction of rural post roads. The bill allows the Secretary of the Department of Agriculture to apportion funds to each state. The original bill appropriated \$75,000,000 between 1917 and 1921 for this purpose. A large part of this sum—more than \$60,000,000—is still available under the original act due to the delay in highway construction caused by the war.

Milwaukee Tire and Supply Men Organize

MILWAUKEE, Jan. 20—Tire and supply dealers of Milwaukee have organized an association for mutual benefit and to eliminate trade abuses of various kinds, notably promiscuous discounting. The new body is known as the Tire Dealers' Association of Milwaukee and officers have been elected as follows:

President, Russell L. Stephens, manager Republic Tire Co., 472 Milwaukee Street; first vice-president, George A. Brown, Brown's Tire Shop, 2428 Lisbon Avenue; second vice-president, Henry F. Stenzel, president and manager Milwaukee Tire & Supply Co., 457-459 Milwaukee Street; secretary, H. A. Packard, Standard Racine Rubber Co., Oneida and Jefferson Streets; treasurer, Lawrence J. Engel, Milwaukee Tire & Rubber Co., 456 Milwaukee Street.

Free Motor Mechanics' School for Chicago

CHICAGO, Jan. 21—A school for training motor mechanics is being established by the Board of Education of this city. It will operate on a continuation plan, the students attending two half days a week and the school being run continuously. It will be a trade school to train men and women in the proper maintenance and operation of motor cars, trucks and other automotive apparatus. Men from service stations, garages and repairshops are sought in particular. Those who conduct the motor car business here, it is said, are going to send employees from their service stations and repairshops to this school and will pay them while attending.

The school is to be located in the building which has been used by the government for training mechanics for the motor transport corps and mechanical divisions of the army. The plan for study includes English, drawing, mathematics, chemistry, physics and mechanics in general. Mechanics will include all units of the motor car. There will be classes in carburetion, ignition, starting, lighting, mechanics of the engine, of the transmission and the differential.

Gasoline Restriction Off in France

Motorists Can Now Buy All They Want at \$1 to \$1.20 a Gallon—Plenty on Hand

PARIS, Jan. 1 (Special Correspondence)—France removed all her gasoline purchase restrictions to-day and gave greater liberty to motorists than they have possessed since the beginning of the war. To purchase gasoline it is no longer necessary to apply to the police or the civil authorities; all that is necessary is the cash to pay for the fuel.

Since the signing of the armistice the gasoline supply has been fairly plentiful. The retail price is \$1 to \$1.20 per gallon outside the city of Paris. At the present time France has a stock of 90,000 tons of gasoline and 50,000 tons of kerosene. Shipments are being made into France at the rate of 90,000 tons per month, and it is expected that this rate will be maintained for a long time. By reason of the return of Alsace and Lorraine to France the country has secured at least 50,000 tons of gasoline per year from the Pechelbronn wells. These wells have been exploited by the Germans for the last four years.

Travel restrictions have not all been removed, but in the interior zone of France motorists can travel within a radius of 30 miles of their homes without any permits or formalities. Beyond this radius it is necessary to show a sufficient reason why the journey should be made by automobile. In the army zone automobile travel is still forbidden except to holders of a special pass issued by the military authorities. It is understood that these travel restrictions are only of a temporary nature. Except in the army zone, there is no sound reason for the 30-mile radius restriction; it is doubtful, indeed, if this law will be enforced with any amount of vigor, for France is too short of man power to place police on the roads for the purpose of holding up motorists.

The French Government is anxious to get the devastated regions thrown open to visitors as early as possible. One government department is working on this problem now, and is planning routes and arranging for the rebuilding of hotels, so that foreign visitors may be received in France this summer. As an indication of the spirit at work, preliminary arrangements have already been made for a huge motor and cycle tour through Alsace during the summer, probably in the month of August.

Price Effect of Oil Discovery in Texas

DALLAS, Jan. 21—Since the recent oil discovery in West Texas and the enormous production that is being made daily, it is generally predicted that within a few months the price of gasoline will be reduced. In fact in some places the price has already been reduced from $\frac{1}{2}$ to 1 cent per gallon, and in Chicago

there is a merry little price war between Texas and Standard. Many refineries are planned or are already under construction in the new oil field. Eight refineries have been erected at Wichita Falls and four at Ft. Worth. Others are to be erected at Abilene, Weatherford, Ranger and Dallas. The average daily production, in Burlburnett and Ranger alone, is said to be about 79,000 bbl. per day.

Highways Committee Formulates New Plans

WASHINGTON, Jan. 18—Post-war plans for highway development by the Highways Transport Committee are being completed. They include uniform state traffic laws and police traffic regulations; stimulation of food production by food distribution via motor truck; a survey of facilities available for highways, transportation and city marketing; transportation facilities for soldier farms, including movements to open up large tracts of grounds for settlements; development of transportation facilities for resources other than agricultural; co-operation with railroads and waterways taking in feeder extensions; co-ordination of highways transport with rail and electric line freight or express; standardization of highway shipping methods, and the placing of returned soldiers experienced in highways transport.

Campaigns for snow removal in the various states are being undertaken through the regional and district organizations. New Jersey has initiated definite plans for handling snow. Other states such as Pennsylvania, New York, Michigan and Ohio are working in co-operation with the Highways Transport bodies through the Highway Commissioner offices. Raymond Beck, field engineer of the committee, is compiling bulletins dealing with the causes of snow drifts, methods of prevention and methods of fighting snow and removing it. These bulletins will be distributed to the various interested agencies.

Employment of Returned Soldiers

BOSTON, Jan. 20—The problem of employing returned soldiers will be discussed by the automobile dealers at a meeting here next week. As the half-page advertisements urging them to re-employ soldiers did not meet with the approval of all the dealers, they have decided to have a conference on the matter. Many dealers have already taken back all the soldiers who have returned, and they will continue the policy as far as possible, regardless of any concerted action.

Johnson to Direct N. A. D. A. Road Work

ST. LOUIS, Jan. 20—Pike Johnson of Washington, who put over the highway transport movement in Colorado, has been made good roads representative of the N. A. D. A. He is at present engaged in good roads educational work and will supply any information desired.

Complete Program for S. A. E. Meeting

Annual Gathering Includes
Four Professional Sessions,
Ladies' Night and Dinner

NEW YORK, Jan. 22—The complete program for the forthcoming annual meeting of the Society of Automotive Engineers, which is to be held in the Engineering Societies Building Feb. 4-6, is now ready and printed copies are being distributed.

Prior to the opening professional sessions on Wednesday morning, Feb. 5, there will be a meeting of the Standards Committee on Tuesday, Feb. 4. Following the close of the professional sessions there will be a ladies' night on the evening of Feb. 5, a reception and dance being scheduled for the North Ballroom of the Hotel Astor.

On the following evening, Thursday, Feb. 6, the society's Victory Dinner will be held in the Grand Ballroom of the Hotel Astor at 7 o'clock. Job E. Hedges will be toastmaster.

After the dinner members and their guests will attend the Midnight Whirl at the Century Grove on the roof of the Century Theater. The S. A. E. has purchased the entire house. The complete program is given at the top of the next column.

Bill to Validate "Informal" Contracts (Continued from page 226.)

compliance with statutory requirements, the contractor or the Government by a duly authorized officer from the Department of Justice may give notice to the Secretary of War of intention to appeal to the commission, and provided notice of appeal is filed with the chairman of the commission within thirty days: Provided, however, That if the representative of the Department of Justice agrees with the action of the War Department there shall be no appeal by the Government but settlement can be made at once. On an appeal being taken the commission shall thereupon proceed to determine the questions at issue as set forth in said notice of appeal; and the contractor shall be entitled either to receive the whole amount of such award as may be made as in full of his claim on the questions submitted or 75 per centum of the same and sue the United States in the Court of Claims for any remainder, all as provided next above as to agreements otherwise within the purview of this act.

That in executing the duties and powers conferred by this act the commission may make its own rules and regulations and may hear and determine issues informally. It shall be the duty of the Secretary of War to furnish to the commission such evidence, documents, or papers pertaining to transactions as to which notice of appeal has been filed as the commission may request. The commission is authorized in its discretion to appoint an examiner in any region or district when such region is within the United States where in its judgment the taking of additional testimony is necessary to the determination of any case. Such examiner shall be a resident of the region or district for which he is appointed, and shall not have any interest, directly or indirectly, in any contract or transaction coming before him or receive any compensation save and except such per diem compensation and expenses as shall be fixed by the commission. Whenever the commission shall refer to any such examiner any claim presented hereunder, the examiner shall proceed, under the direction of the commission, to hear the parties, take the proofs, and return the same to the commission with his recommendations thereon as promptly as possible.

SEC. 3. That nothing in this act contained shall be held to validate any such contract unless the officer who was at the time of

PROGRAM FOR THE S. A. E. ANNUAL MEETING

Wednesday, Feb. 5

Tanks	Lieut.-Col. Herbert W. Alden
Automotive Ordnance Apparatus	William G. Wall
Principles of the Wheeled Farm Tractor	Edward S. Hewitt
Automotive Applications of Marine Engines in the War	George F. Crouch
Probable Effect of Aeronautic Experience on Automobile Practice	Henry M. Crane
High Efficiency Automobile Engines	Howard Marmon
Development of the U. S. Standard Military Truck	O. E. Hunt
	D. McCall White
	J. G. Utz

Thursday, Feb. 6

Symposium on Fuel	Dr. Joseph E. Pogue
Unmined Supply of Petroleum in the U. S.	Dr. David White
Present Status of Refinery Practice in the U. S.	Dr. E. W. Dean
Status of Engine Efficiency in the U. S.	Dr. H. C. Dickinson
More Efficient Utilization of Fuel	C. F. Kettering
Mexico as a Source of Petroleum and Its Products	E. De Golyer
Liberty Engine	J. G. Vincent
Fixed Radial Cylinder Engine	John W. Smith
Proportioning Airplanes to Their Engines	Lieut. Alexander Klemin
Making the Airplane a Utility	Grover C. Loening
Problems of the Naval Aircraft Factory	Commander H. C. Richardson, U. S. N.
Navy Dirigibles	Starr Truscott
Operation of Naval Aircraft	Commander J. H. Towers, U. S. N.

the making of such contract the chief of the division or bureau, as the case may be, in which said contract was negotiated, or in the event that such officer was not responsible for the making of such contract, then the officer in such division or bureau who was so responsible, together with the officer who signed said contract, shall each severally make and subscribe to an affidavit in writing, giving the definite terms of such contract, the name or names within his knowledge, of any such officer or officers who took part in the negotiation or making of the same, and stating whether or not within his knowledge any officer aiding in such making was interested, directly or indirectly, in said contract, and in addition subscribing to an oath to be appended to said affidavit in substantially the following form and tenor:

"I, _____, Chief of the Division or Bureau (naming it) in which the contract hereinbefore mentioned was negotiated, at the time of negotiation thereof, and the officer in the Division or Bureau (naming it) responsible for the making of the contract hereinbefore mentioned, and I, _____, the officer who actually signed said contract, do hereby each severally swear that I am not and was not at the time of the making of said contract directly or indirectly interested in said contract."

That in respect to any such contract as to which any one of said officers can not take the foregoing oath, or after diligent search or inquiry by the contractor cannot be found, or is at the time actually engaged in foreign service, or refuses to take said oath, then upon such facts and the fact required in the oath of such officer, appearing by an affidavit, of the contractor, or of one of its partners, chief officers or chief agents acting in its behalf, the Secretary of War shall promptly report such contract to the War Contracts Appeals Commission, and furnish to said commission such evidence, documents, and papers pertaining to the transaction as may be within his control, and such commission may request, and original jurisdiction is hereby vested in, said commission to hear and determine said claim with the powers and upon the procedure hereinbefore described in this act. Said commission shall make its award or finding thereon, and deny said claim or grant it in whole or in part, according to the justice and equity thereof, and the award or finding shall have the same force and effect, and create the same rights as if made under the provisions of section three of this act. And it shall be the further duty of said commission in hearing, investigating, and determining such claim to find and determine whether any of such officers is or was at the time of the making of said contract directly or indirectly interested in said contract.

SEC. 4. That nothing in this act contained shall be construed to relieve any officer or agent of the Government from prosecution under the penal statutes of the United States for any fraud, criminal conduct, illegality, or irregularity in connection with any of the agreements or orders referred to herein or the execution or signing thereof.

French Plant for Doble-Steamer

DETROIT, Jan. 20—The Doble-Detroit System Motors Co. has closed a deal

whereby their car will be placed on the European market by the Society of Francais Doble, Paris, and the Detroit plant is about to ship its first complete machine to France. The French company is given the exclusive manufacturing and sales rights in France.

Henry Chevalier, formerly in charge of the Russian Renault Co., as director of technic, has returned to Paris after spending several months in Detroit, testing the car and studying manufacturing details. Paul Sicault, for a number of years identified with the Renault company in both France and Russia, is general manager of the Francais-Doble plant. A number of prominent French munition and automobile makers are interested in the foreign company and immediate production is being planned on a large scale.

Olympian Building Cars Again

PONTIAC, Jan. 21—The Olympian Motors Co., which for several months has engaged almost exclusively in war work, is getting back into passenger car production again. Although the Government contract calling for the manufacture of aerial drop bombs will keep the munition end of the plant running for some time, the company is busy re-organizing for resumption of its peace time business, and is now building three cars weekly.

The war contract will be completed by March 1. By that time the company expects to be turning out from ten to fifteen complete cars daily and have 400 men working in the motor car department.

The new Olympian car will be identical to that shown at the New York show last year with the exception of a few minor changes, the nature of which will be announced in a short time. No price reduction is contemplated, and the company is guaranteeing its dealers and distributors against a price drop. It sells for \$1,249. The 1919 production schedule calls for the manufacture of 5000 cars. Frost-Norton Motors Co. of Pittsburgh, ordered 500 cars for immediate shipment.

Coal Production Increases 34,092,437 in Year

WASHINGTON, Jan. 21—Bituminous coal production for the week ended Jan. 11, 1919, totalled 10,287,000 tons as compared with 8,428,000 tons for the week ended Jan. 4, and 10,163,000 tons during the week of Jan. 11, 1918.

Anthracite coal production for the week totalled 1,651,000 tons, an increase of 262,000 tons over the production of the week of Jan. 4, but a decrease of 68,000 tons as compared with the corresponding week of 1918.

During the week ended Jan. 4, total losses of output of bituminous coal were 25.4 per cent, of which no market comprised 12.3 per cent, labor shortage 5.9 per cent, mine disability 3.6 per cent, car shortage 2.1 per cent and all other causes 1.5 per cent.

Bituminous coal production for the year 1918 amounted to 585,883,000 tons as compared with 557,790,563 tons for 1917, an increase in production of 34,092,437 tons for the year. Following is the bituminous coal production by months for 1917 and 1918:

Deeds Is Completely Exonerated

(Continued from page 227)

ings be instituted against Col. Deeds based upon those publications, because it is doubtful whether he ever saw the paragraph which has been adversely criticized and the statement contained in it was in accord with what Col. Deeds apparently believed and had reasonable cause to believe to be the facts."

In conclusion, the findings quote John D. Ryan, former head of aircraft production, to the effect that Col. Deeds performed a great service in expediting Liberty engine production and by not observing the strict regulations probably hastened quantity production by many months. Following is the letter correspondence from Secretary Baker to the Military Affairs Committee:

Chairman Committee on Military Affairs,
House of Representatives:

Upon the submission to the President of the report of Honorable Charles E. Hughes and the report of the Attorney General covering the Aircraft investigation, I directed that the specific recommendations contained in these reports be extracted for my consideration and for such action by me as might be required in the premises. These extracts were referred to the Judge Advocate General of the Army, directing a thorough and comprehensive inquiry into the allegations affecting the conduct of Colonel Deeds. He was directed, not only to review all evidence taken by Judge Hughes, which the Attorney General kindly made available, but to secure all other facts obtainable in this case.

The Judge Advocate General committed the matter to a board of review consisting of officers of high ability and character wholly disassociated from any previous business or personal relations either with Colonel Deeds or with any matters affecting aircraft production. This board carefully and systematically examined all of this evidence and obtained all possible additional facts, and its conclusions are, therefore, based upon fuller inquiry than was found possible within the time and opportunities at the disposal of Judge Hughes, and this examination is in effect the accomplishment of the thorough inquiry which Judge Hughes had in mind when he suggested that these transactions be examined by a court martial. The purpose of Judge Hughes' suggestion is therefore accomplished.

This record undoubtedly shows that Colonel Deeds, absorbed in the activities of aircraft production, neglected to give his personal attention to transactions affecting his personal financial affairs, and this neglect on his part gave rise to appearances which required painstaking investigation in order to show their true character.

The unanimous report of this board of review, approved by the Acting Judge Advocate General, recommends that Colonel Deeds be not tried by court martial on any of the grounds suggested, and this recommendation has been approved by me.

Colonel Deeds was one of a large group of men who came to Washington at great personal and pecuniary sacrifice to render service to the Government, in the great emergency caused by our participation in the war.

My duty as Secretary of War with regard to any public servant under my jurisdiction is clearly to bring about proper punishment for wrongdoing and equally clearly to protect those public servants whose conduct is faithful and upright against embarrassment, humiliation or loss.

Very wide publicity has been attached to the acts of Colonel Deeds as a member of the Aircraft Board. Whether it will ever be possible to overtake the judgments which have been formed upon partial information on this subject I do not know; but this Department will make every effort to secure the widest publicity for the action now taken and for the grounds upon which it rests. To carry this into effect, I am therefore transmitting to your Committee for its information, and with the request for its publication in the Record, if the proprieties of the situation permit, a copy of the report of the Judge Advocate General. Similar copies are being furnished the Chairman, Committee on Military Affairs, United States Senate, the Attorney General and Colonel Deeds.

Inasmuch as the purpose of Judge Hughes' suggestion has been accomplished, I have directed that all the records in this case be filed in the War Department and that this matter be considered as closed. Cordially yours, Newton D. Baker, Secretary of War.

A Summary of the Movement of Crude Petroleum in November, 1918

WASHINGTON, Jan. 21—The comparative summary of the movement of crude petroleum, compiled from reports received by the U. S. Geological Survey, represents the operations of 220 pipe-line and refining companies handling or receiving oil directly from the productive fields east of the Rocky Mountains. Statistics of petroleum movement in California are not included for the reason that first-hand data were not available.

1918 Output of Petroleum Breaks Record

WASHINGTON, Jan. 21—The quantity of crude petroleum marketed from oil wells and field storage tanks in the United States in 1918 reached the record-breaking total of 345,500,000 bbl., as shown by preliminary estimates made by John D. Northrup of the United States Geological Survey. This output is an apparent gain of 3 per cent over the former high record, 335,315,601 bbl., established in 1917.

The output in 1918 includes no less than 6,500,000 bbl. of crude oil removed from field storage, but excludes drafts aggregating 20,500,000 additional bbl. from stocks of pipe-line companies. The surface reserve of crude oil held by oil producers and pipe-line companies in the United States at the end of 1918 is estimated at 123,000,000 bbl., compared with 150,000,000 bbl. at the end of 1917. These figures show that the demand for domestic petroleum in 1918 amounted to about 366,000,000 bbl. The exports of crude oil, most of it to Canada and to northwestern Mexico, aggregated about 5,500,000 bbl., leaving a total of 360,500,000 bbl. available to supply domestic needs. This quantity was insufficient, however, and about 36,500,000 bbl. was imported, nearly all from Mexico, to meet domestic requirements, which amounted in all to about 397,000,000 bbl.

The output is apportioned among the major fields as follows:

Field	1918	1917
Appalachian	25,300,000	24,932,205
Lima-Indiana	3,100,000	3,670,293
Illinois	13,300,000	15,775,860
Oklahoma-Kansas	139,600,000	155,043,596
Central & North Texas	15,600,000	10,900,646
North Louisiana	13,000,000	8,561,963
Gulf Coast	21,700,000	26,087,587
Rocky Mountain	12,600,000	9,199,310
California	101,300,000	93,877,549
Alaska & Michigan	.....	10,300

Stroh Insures Employees

DETROIT, Jan. 20—The Stroh Casting Co. has purchased a group life insurance policy to cover the employees of its plant. Insurance will be issued each employee according to his length of service and automatically increases in amount as his term of service increases. Those employed from 3 to 6 months will benefit to the extent of \$250, from 6 months to 1 year, \$500; from 1 to 2 years, \$1,000; from 2 to 3 years, \$1,500; from 3 to 4 years, \$2,000; from 4 years and over \$2,500. In case of permanent disability, the company is prepared to pay the insured the amount of his policy.

Crude Petroleum Moved from Field Sources

Field	November, 1918.	October, 1918.	November, 1917.	Oklahoma-Kansas	15,251,099	13,897,644	15,033,159
Appalachian	2,160,909	2,398,947	2,132,583	Central and No. Texas	1,362,330	1,732,453	1,016,318
Lima-Indiana	237,315	242,054	282,227	North Louisiana	1,305,950	1,354,441	653,030
Illinois	1,019,300	1,145,193	1,246,105	Gulf Coast	1,656,674	1,699,138	1,612,927
Oklahoma-Kansas	11,334,048	11,763,898	13,822,893	Rocky Mountains	1,213,252	1,235,470	868,043
Central and No. Texas	1,904,399	1,740,443	989,486				
North Louisiana	1,321,715	1,483,168	290,487				
Gulf Coast	1,591,685	1,866,393	1,502,122				
Rocky Mountains	1,214,528	1,196,740	781,913				

Class of oil.	November, 1918.	October, 1918.	November, 1917.	Stocks of crude petroleum at end of month.
Appalachian	2,179,361	2,387,174	2,312,448	Appalachian 3,428,226 3,446,978 4,062,729
Lima-Indiana	390,943	176,805	259,368	Lima-Indiana 1,207,569 1,361,197 2,002,660
Illinois	1,019,300	1,342,725	1,258,959	Illinois 2,177,090 2,177,607 4,154,867
				Oklahoma-Kansas 73,813,897 77,730,948 99,194,063
				Central and No. Texas 5,155,017 4,612,948 2,382,671
				North Louisiana 4,766,964 4,751,199 2,926,185
				Gulf Coast 7,905,067 7,970,056 9,277,697
				Rocky Mountains 965,407 964,131 494,878

Plan a Limited Air Service

War Department Bill Provides Personnel for 2000 Planes—

M. T. C. Small, Too

WASHINGTON, Jan. 20—Indications of the size of the future Air Service, Motor Transport Corps and Tank Corps Division of the Army are given in a proposed bill drawn up by the War Department this week. The bill, which will probably be held in abeyance pending possible developments in Europe, calls for an Air Service of 1923 officers and 21,853 enlisted men. The officers include one major general, one brigadier general, twenty-two colonels, forty-five lieutenant colonels, 126 majors, 438 captains, 696 first lieutenants and 594 second lieutenants. An organization of this size would require approximately 2000 airplanes in constant service.

The Motor Transport Corps, according to the proposed bill, will comprise one brigadier general, eight colonels, twenty-two lieutenant colonels, fifty-eight majors, sixty-one captains, 283 first lieutenants, 649 second lieutenants and 20,737 enlisted men. This organization will constantly require 10,000 motor trucks and other vehicles for its equipment. The Tank Corps will comprise 377 officers and 5855 enlisted men.

Direct Phone Connection with Airplane

WASHINGTON, Jan. 20—Communication between an airplane in the air and a regular telephone on the Washington city line was established yesterday at the office of Major-General William L. Kenly, Director of Military Aeronautics. Although regular radio telephonic conversation frequently has been held with planes in the air at flying fields, this is the first demonstration of the combination of the radio-phone and regular land telephone.

General Kenly, Colonel F. R. Kenney and Colonel C. C. Culver were present in the office of the Director of Military Aeronautics and talked with Lieutenant Lucas, who was piloting a plane from Bolling Field. The two links in the line were the radio-telephone from the plane to the small station at Bolling Field, and the city telephone system from Bolling Field to General Kenly's office. The conversion of radio to direct wire was made automatically at the Bolling Field station with apparatus devised by members of the Air Service Radio Branch under the direction of Colonel Culver.

New Aviation Insignia

WASHINGTON, Jan. 17—An insignia for fliers has been approved with certain changes as follows: (a) Military aviators, junior military aviators and reserve military aviators: a device of oxidized silver consisting of a pair of wings with the shield between; to measure 3 in. from tip to tip.

(b) Military aeronaut, junior military aeronaut and reserve military aeronaut: a device of oxidized silver consisting of a pair of wings with a balloon between; to measure 3 1/2 in. from tip to tip.

(c) Observer: an oxidized silver single wing to the left of the letter "O" in bright silver; the "O" to encircle the letters "US" in oxidized silver in relief on an oxidized silver background; the device to measure 1 1/2 in. in length.

Flying instructors: gilt insignia of the same design and size as the insignia for officers of the Air Service, omitting the propeller; to be worn just above the right cuff on all coats.

Navy Dirigible in Air 40 Hours

WASHINGTON, Jan. 20—Two remarkable endurance flights by the Navy Dirigible A-236 from the naval air station at Key West, one lasting 32 hours and covering 750 miles, and the other 40 hours and 48 minutes, and covering about 850 miles, constituting a service record, were described in official reports made public last night.

Rising winds and threatening storm stopped the first flight Nov. 24, although sufficient fuel and oil remained for 8 more hours. During the first 10 hours the ship was lightened 300 lb. by consumption of gasoline. Her crew brought her down to within 50 ft. of the sea and with buckets and line took up enough water to restore her propeller balance.

The second trip, made Dec. 24-25, was made under overcast skies with a wind ranging from 20 to 36 miles an hour. The propelling motor was stopped only twice, for 3 minutes each time, to fill the oil reservoir.

U. S. Naval Aircraft Production

WASHINGTON, Jan. 20—The U. S. Naval Aircraft factory at Philadelphia produced aircraft valued at \$5,435,000 up to the time the armistice was signed, according to an announcement made here to-day. It had completed, ready for shipment, 183 twin-engine flying boats at an average cost of \$25,000. It had also produced 4 experimental Liberty engine seaplanes carrying the Davis non-recoil gun, at a cost of \$40,000 each, and 50 sets of twin-engine flying boat spare parts worth \$10,000 per set. In addition, considerable minor experimental work and overhauling of machines from other stations was done.

Two Aviators Killed in Week

WASHINGTON, Jan. 21—According to the official statement, there were two fatalities at the aviation training fields throughout the United States during the week ended Jan. 11, one occurring at Park Field, Millington, Tenn., and the other at Carruthers Field, Benbrook, Tex.

No Show for Montreal

MONTREAL, Jan. 21—At the special general meeting of the Montreal Automobile Trade Association, Ltd., it was decided that no show will be held under the auspices of the association during 1919.

Much Confusion About Labor

Conflicting Reports Regarding Shortages and Unemployment Unreconcilable

WASHINGTON, Jan. 20—Considerable confusion and doubt as to accurate labor conditions throughout the country exist here as a result of conflicting statements made by various officials. On one hand during the past week there have been reports from the Department of Labor and officials of the American Federation of Labor indicating increasing labor surpluses and threatening possible labor troubles as a result. On the other hand, there are denials of these conditions made by Congressmen following receipt of information directly from the various cities supposed to be suffering from labor surplus.

It is stated on one hand that the reports of surplus of labor are to some extent calculated to produce a slackening of army demobilization and consequently continue labor shortage as much as possible, with a consequent maintenance of the war wage standard. Labor authorities, however, maintain that the surplus reported is correct, and that if demobilization continues at the present rapid rate serious unemployment conditions will result.

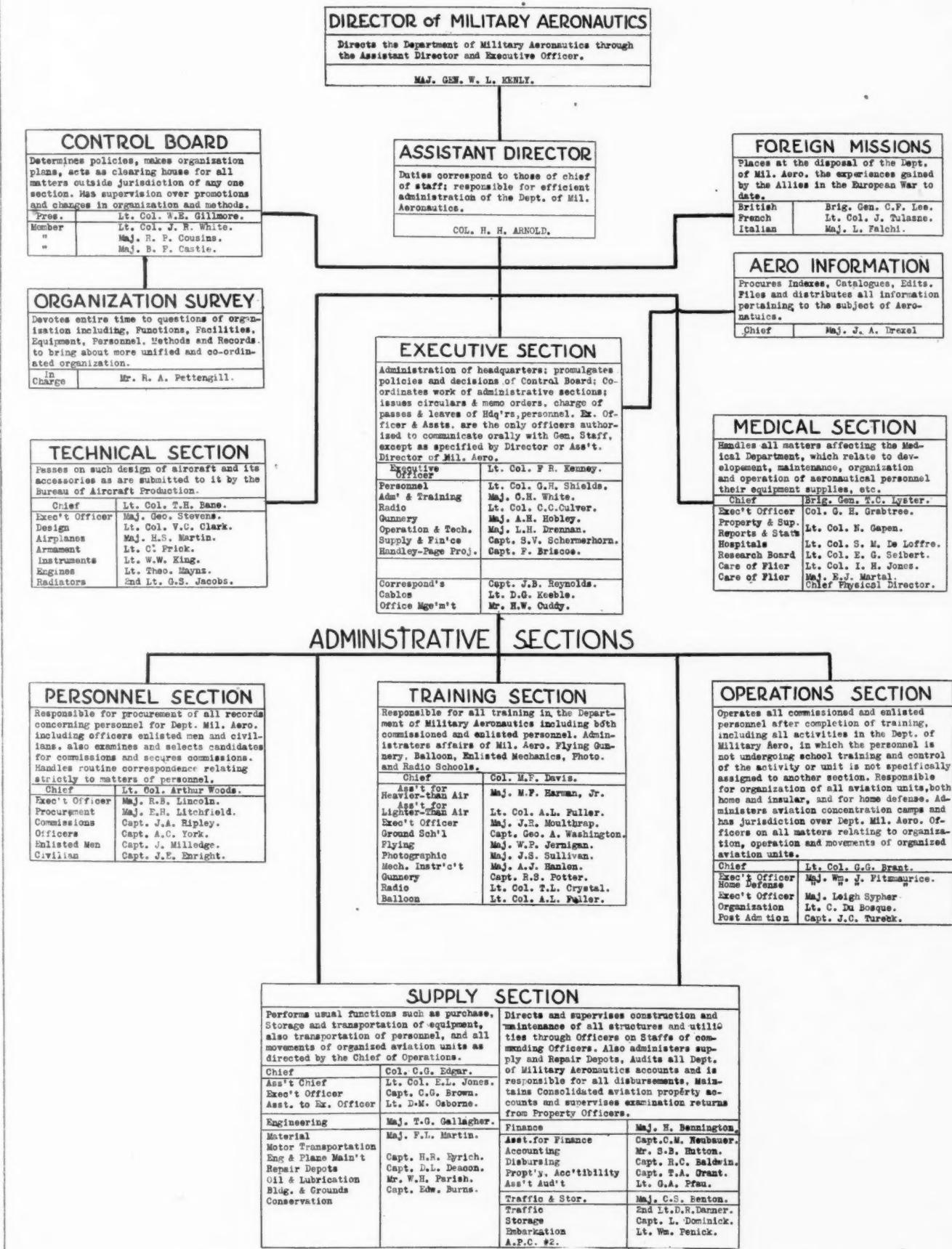
Reports received during the past week by the Department of Labor indicate a demand for agricultural labor in Arizona, South Carolina, Texas, a slight demand in the building trades in Arkansas, Maine, Oklahoma and Virginia. There is a surplus of labor throughout California, Colorado, Connecticut, Illinois, Indiana, Iowa, Kentucky excepting Louisville, Massachusetts, Michigan, Missouri, New Mexico, New York, Oregon and Utah.

Normal conditions exist in Kansas, while the demand exceeds the supply in Maryland, Minnesota, New Jersey, Pennsylvania, Virginia, Washington and Wyoming. A large surplus of unemployed is reported from Detroit. Rubber workers are in demand in Ohio, and unsettled labor conditions are reported from Toledo. The United States Employment Service reports registering 147,774 applicants for jobs, of whom 103,868 were placed in positions. During the same period 247,619 calls for labor were received. Of the registrants 15,882 were women.

As evidence of the confusion of reports, Pennsylvania shows 18,808 registrations for positions wanted during the week and 57,428 calls for help wanted in the same period.

Twelve states reported a surplus of common labor, according to the department's statement, which adds that Detroit has a surplus of 20,000, Cleveland 20,000, Buffalo 12,000 and Toledo 10,000 workers, while Baltimore has a shortage of 4800, Philadelphia 6000 and Pittsburgh 4000 workers.

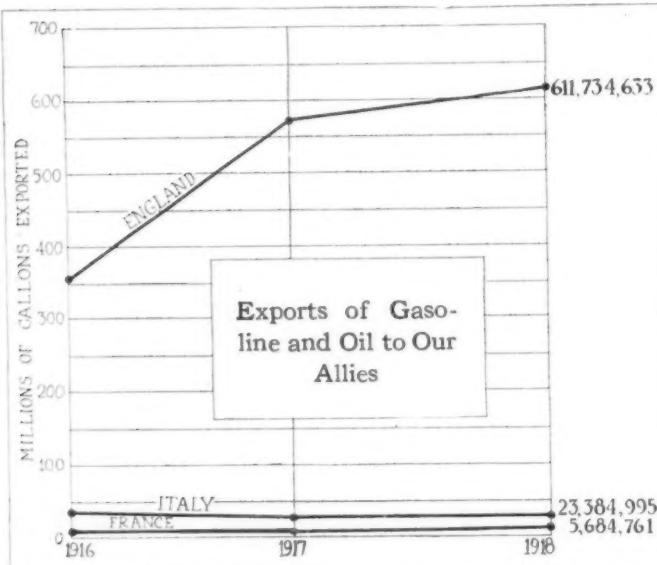
Present Organization of Department of Military Aeronautics



AUTOMOTIVE MATERIALS MARKETS

Materials Market Prices

Acids:			
Muriatic, lb.	.02	-.03	
Phosphoric (85%)	.35	-.39	
Sulphuric (60%), lb.	.008		
Aluminum:			
Ingot, lb.	...	.33	
Sheets (18 gage or more), lb.	...	.42	
Antimony, lb.	...	.07 $\frac{1}{4}$ -.08	
Burlap:			
8 oz., yd.	...	.10 $\frac{1}{2}$	
10 $\frac{1}{2}$ oz., yd.	...	.16 $\frac{1}{2}$	
Copper:			
Elec., lb.	...	.23	
Lake, lb.	...	.20	-.23



Our exports of gas and fuel oil to England, France and Italy during the first 10 months of 1918 indicate the enormous needs of Britain's navy. No doubt a large quantity was shipped for use by the U. S. overseas fleet

Nickel, lb.	40	Smoked, ribbed sheets, lb.	.52 $\frac{1}{2}$
Oil:			
Gasoline:			
Auto. gal.	.24 $\frac{1}{2}$		
68 to 70 gal.	.30 $\frac{1}{2}$		
Lard:			
Prime City, gal.	2.05-2.10		
Ex. No 1. gal.	1.25		
Linseed, gal.	1.58-1.59		
Menhaden (Dark), gal.	1.20-1.22		
Petroleum (crude):			
Kansas, bbl.	2.25		
Pennsylvania, bbl.	4.00		
Rubber:			
Ceylon:			
First latex pale crepe, lb.	.53 $\frac{1}{2}$		
Brown, crepe, thin, clear, lb.	.46	-.47	
Tin	.71	-.72	
Tungsten, lb.	2.00	-.250	
Waste (cotton), lb.	.12 $\frac{1}{4}$ -.17		

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only per 100 lbs.	Primes when seconds up to 15 per cent are taken per 100 lbs.
Automobile body stock	\$5.95	\$5.85
Automobile body stock, deep stamping	6.20	6.10
Automobile body stock, extra deep stamping	6.45	6.35
Hood, flat, fender, door and apron, or splash guard stock	6.05	5.95
Crown fender, cowl and radiator casing, extra deep stamping	6.55	6.45
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20
Automobile Sheet Extras for Extreme Widths:		
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.		
Nos. 19 and 21 over 36 in. to 44 in., 30c. per 100 lb.		
Nos. 22 to 24 over 26 in. to 40 in., 40c. per 100 lb.		
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.		
Black Sheet Extras to Apply to Narrow Widths:		
Oiling, 10c. per 100 lb.		
Patent leveling, 25c. per 100 lb.		
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.		
Seconds 10 per cent less than the invoice Pittsburgh price for corresponding primes.		

Automotive Securities on the Chicago Exchange at Close Jan. 18

	Net Bid	Asked	Ch'ge		Net Bid	Asked	Ch'ge		Net Bid	Asked	Ch'ge	
Auto Body Company	6 $\frac{1}{2}$	8 $\frac{1}{2}$	+1 $\frac{1}{2}$		Motor Products Corp.	40	..		Ajax Rubber Co.	73 $\frac{1}{2}$	74	+5 $\frac{1}{2}$
Briscoe Motor Car, Com.	11	..	..		Nash Motors Co., com.	160	175	-15	Firestone T. & R., com.	140	145	..
Briscoe Motor Car, pfd.	40	55	..		Nash Motors Co., pfd.	90	95	..	Firestone T. & R., pfd.	95 $\frac{1}{2}$	100	..
*Chandler Motor Car	103	105	-2		National Motor Co.	6	10	..	Fisk Rubber Co., com.	84	86	..
Chevrolet Motor Car	154	156	..		Packard Motor Car, com.	112	..	+2	Fisk Rubber, 1st, pfd.	97	100	..
Cole Motor Car Co.	90	105	..		Packard Motor Car, pfd.	100	..	+1 $\frac{1}{2}$	Fisk Rubber, 2nd pfd.	85	90	..
Continental Motors, com.	8	8 $\frac{1}{2}$	..		Paige-Detroit Motor, com.	24	25	.. $\frac{1}{2}$	Fisk Rubber, 1st pfd. conv.	100	105	..
Continental Motors, pfd.	94	97	..		Paige-Detroit Motor, pfd.	8 $\frac{1}{2}$	9 $\frac{1}{2}$	..	Goodrich, B. F., com.	61	62	+3 $\frac{1}{2}$
Edmunds & Jones, com.	19	22	..		Peerless Motor Truck	18	21	..	Goodrich, B. F., pfd.	101	103 $\frac{1}{2}$	- $\frac{1}{2}$
Edmunds & Jones, pfd.	75	90	..		Pierce-Arrow Mot. Car, com.	39 $\frac{1}{2}$	40 $\frac{1}{2}$	-2 $\frac{1}{2}$	Goodyear T. & R., com.	230	235	+9
Electric Storage Bat.	50	55	..		Pierce-Arrow Mot. Car, pfd.	102	..	+1 $\frac{1}{2}$	Goodyear T. & R., 1st pfd.	104 $\frac{1}{2}$	106	+1 $\frac{1}{2}$
Federal Motor Truck	32	35	-1		Premier Motor Corp., com.	5	..		*Goodyear T. & R., 2nd pfd.	103	104	-2
Fisher Body Co., com.	36 $\frac{1}{2}$	42	+ $\frac{1}{2}$		Premier Motor Corp., pfd.	75	..		Kelly Springfield, com.	71	71 $\frac{1}{2}$	+2 $\frac{1}{2}$
Fisher Body Co., pfd.	92 $\frac{1}{2}$	93 $\frac{1}{2}$	+ $\frac{1}{2}$		Prudden Wheel Company	15 $\frac{1}{2}$	17 $\frac{1}{2}$	..	Kelly Springfield, 1st pfd.	90	100	+5
Ford Motor of Canada	245	260	-20		Reo Motor Car Co.	21 $\frac{1}{2}$	22 $\frac{1}{2}$	-3 $\frac{1}{2}$	Lee Tire & Rubber Co.	22	22 $\frac{1}{2}$	+ $\frac{1}{2}$
General Motors, com.	123	124	-5 $\frac{1}{2}$		Republic M. Truck, com.	35	38	..	Marathon Tire & Rubber.	55	..	
General Motors, pfd.	83 $\frac{1}{2}$	85 $\frac{1}{2}$	+ $\frac{1}{2}$		Republic M. Truck, pfd.	87	90	..	Miller Rubber Co., com.	142	148	..
Hupp Motor Car, com.	6 $\frac{1}{2}$	6 $\frac{1}{2}$	+1 $\frac{1}{2}$		Saxon Motor Car, com.	6 $\frac{1}{2}$	8 $\frac{1}{2}$	-1 $\frac{1}{2}$	Miller Rubber Co., pfd.	96	98	..
Hupp Motor Car, pfd.	86 $\frac{1}{2}$	..	+1 $\frac{1}{2}$		Scripps-Booth Corp.	21	25	..	Rubber Products Co.	101	..	
Kelsey Wheel Co., com.	30 $\frac{1}{2}$	34 $\frac{1}{2}$	+ $\frac{1}{2}$		Stewart-Warner Speed Corp.	87 $\frac{1}{2}$	89 $\frac{1}{2}$	+2 $\frac{1}{2}$	Portage Rubber Co., com.	145	149	..
Kelsey Wheel Co., pfd.	86	90	-2		Stromberg Carburetor Co.	33	38	..	Swinehart T. & R. Co.	50	60	..
Manhattan Electric S., com.	48	..	..		Studebaker Corp., com.	48	49	-3 $\frac{1}{2}$	U. S. Rubber Co., com.	76 $\frac{1}{2}$	76 $\frac{3}{4}$	-1
Maxwell Motor, com.	27 $\frac{1}{2}$	28 $\frac{1}{2}$	- $\frac{1}{2}$		Studebaker Corp., pfd.	92 $\frac{1}{2}$	97	-1 $\frac{1}{2}$	*U. S. Rubber Co., pfd.	109	110	..
Maxwell Motor, 1st pfd.	51 $\frac{1}{2}$	52 $\frac{1}{2}$	-1		Stutz Motor Car Co.	49 $\frac{1}{2}$	50 $\frac{1}{2}$	+ $\frac{1}{2}$				
Maxwell Motor, 2nd pfd.	19 $\frac{1}{2}$	20 $\frac{1}{2}$	-1 $\frac{1}{2}$		United Motors Corp.	34 $\frac{1}{2}$	36 $\frac{1}{2}$	+1 $\frac{1}{2}$				
McCord Mfg., com.	32	35	..		White Motor Co.	45 $\frac{1}{2}$	46 $\frac{1}{2}$	+ $\frac{1}{2}$				
McCord Mfg., pfd.	93	96	..		Willys-Overland, com.	24	25	-1				
Mitchell Motor Co.	24	30	+1		Willys-Overland, pfd.	88 $\frac{1}{4}$	88 $\frac{1}{2}$	+1 $\frac{1}{2}$				

*Ex. dividend.

Capt. Harold J. Vogler was appointed district sales manager for the Service Motor Truck Co., assigned to District No. 2, which includes Maryland, Virginia, District of Columbia and the Carolinas, and took up his new work on Jan. 1. Previous to entering the army, Captain Vogler was wholesale manager for the Willys-Overland Co. and also had charge of its dealer organization in the East. Prior to his connection with Willys-Overland he was Eastern superintendent for the Maxwell Co.

P. J. W. Kelley has joined the sales force of Gray & Davis, Inc., as sales engineer.

Roy T. Middleton, who in May, 1917, resigned as Detroit manager for the Steel Products Co. to enter the air service in France, reached Detroit last week as Capt. Roy T. Middleton and is on his way to Cleveland to become general representative for the Standard Steel Casting Co.

Glenn L. Orr, who has been connected with the Briscoe Motor Corp., Jackson, as purchasing agent, has resigned to become secretary of the M. H. Herrmann interests, Detroit.

M. L. Hemingway has been appointed assistant manager of the Motor and Accessory Manufacturers' Association. He assumed his new duties Jan. 18. For the past year he has been secretary of the War Service Committee of the Rubber Association of America.

L. P. Prossen has resigned as mechanical superintendent of the Black & White Taxicab Co., New York, and has become associated with the Nilson-Miller Co., Hoboken, where he has been elected vice-president, and will be in charge of the gear cutting, piston and piston ring departments.

E. R. Greer, at one time engineer of the Emerson-Brantingham Implement Co.'s tractor plant at Minneapolis, has been placed at the head of the service department of the Four Wheel Drive Auto Co.

C. H. Smith has recently joined the A. B. C. Casting Co., Cleveland, to take charge of its aluminum forging development work. He was formerly with the Driggs-Seabury Ordnance Corp. and later with the Ladish Drop Forge Co., Cudahy.

Sutherland G. Taylor, Jr., who has been appointed export manager for the Holt Mfg. Co., assumed his duties at the Peoria plant Jan. 1. For several years Mr. Taylor was vice-president and New York manager of Cyrus Robinson & Co., engineers and exporters of New York and London. He has recently received his discharge from the army, where as lieutenant in the Ordnance Department he was assistant to the chief of the Motor Equipment Section.

Men of the Industry

Changes in Personnel and Position

Larger Duties for Lt. Col. Jones

WASHINGTON, Jan. 17—Lt. Col. R. M. Jones, A. S., A. P., was appointed Assistant and Executive Officer to the Acting Director of Aircraft Production on Dec. 28. In addition to his present duties as Executive Officer, he will also be charged with such activities as pertain to liaison, correspondence with the War Department and other departments or bureaus of the government.

Lt. Col. H. C. Clark, A. S., A. P., in addition to his other duties, will take over the duties of adviser and assistant to the Acting Director on matters pertaining to personnel for the bureau.

Lt. Col. O. Westover, A. S., A. P., is appointed assistant to the Acting Director of Aircraft Production.

Major George F. Lyons, A. S., A. P., is hereby appointed assistant to the Acting Director of Aircraft Production.

Two New Vice-Presidents for the Republic Rubber

YOUNGSTOWN, Jan. 10—Harvey J. Woodard and Mark W. Roe have been advanced to the position of vice-president of the Republic Rubber Corp. Mr. Woodard becomes vice-president in charge of sales and Mr. Roe vice-president in charge of the plant. Mr. Roe joined the Republic as consulting engineer.

Lt. Ezra W. Clark, having received his discharge from the Air Service, has become advertising manager for the Clark Equipment Co., Buchanan, Mich. Mr. Clark was for many years editor of the Chicago Inter-Ocean, and later business manager of the Mobile Item and advertising manager of the Memphis News Scimitar.

Fred M. Elvidge, Jr., has received his discharge from the army and has resumed his desk at the New York office of the Ajax Rubber Co., where he is the branch store supervisor. He left Ajax in February to join his regiment and then went through the Officers' Training School at Camp Gordon, emerging with a commission of second lieutenant. The resumption of his duties will once more place him in charge of the branch stores throughout the country.

Eugene W. Lewis, former vice-president of the Timken-Detroit Axle Co., which position he relinquished to become chief of the production branch of the general staff of the army in Washington, has completed his work, and will take a long rest before resuming his business activities.

W. E. Biggers, who has been appointed assistant to the president of the Owosso Mfg. Co., maker of screen doors and window screens, at Owosso, Mich., will take up his new duties on Feb. 1. For four years Mr. Biggers was advertising manager of the Hyatt Roller Bearing Co., and is now advertising manager of the Motor Equipment Division, United Motors Section, General Motors Corp., which includes the advertising management of the Hyatt Roller Bearing Co., the Klaxon Co., the Jaxon Steel Products Co. and the Harrison Radiator Corp.

Walter A. Almy has been promoted from the position of manager of the passenger transportation department to that of general distribution manager of the Packard Motor Car Co., Philadelphia.

Captain G. F. Aitken of the U. S. Army Ordnance Department has returned to the sales organization of the Detroit Cadillac Motor Car Co., New York.

W. J. Johnson, who for some years has looked after the interests of the Connecticut Telephone & Electric Co. with automobile manufacturers, has been promoted to the position of field sales manager.

Norman S. Hobson, on his release from military service, has associated himself with the Connecticut Telephone & Electric Co. and will handle the sales in New England and upper New York State.

Victor W. Peterson, formerly advertising manager of the Stewart-Warner Speedometer Corp., has now become associated with the Wm. R. Johnson Mfg. Co., 359-361 E. Ohio Street, Chicago, in the capacity of general manager.

F. W. Sutton, formerly production manager of the Continental Motors Corp., and later general superintendent of the Dayton-Wright Airplane Co., is now the chief engineer of the Charles E. Dedeaux Co., industrial engineers, with headquarters in Cleveland.

R. Y. Cooke has been made secretary and general sales manager of the Racine Rubber Co., Racine, and director of the Ajax Rubber Co., New York. He succeeds Mr. Severance, who died recently.

Gilbert U. Radoye has become associated with the Haynes Automobile Co., Kokomo, as advertising manager and assistant sales manager. He was formerly affiliated with the advertising division of the Hudson Motor Car Co., the Packard Motor Car Co. and with the Nordyke & Marmon Co.

Charles M. Jessup, who for the past 4 years has been directing the motor equipment of the Remy Electric Co., Detroit, has been appointed assistant to O. F. Conklin, president of the company. In addition to his new duties as assistant to the president, he will have charge of the sales of the motor equipment division, and will be located at the Detroit office.

U. S. Light & Heat Corp. Devoted 75 Per Cent Activities to Government

NIAGARA FALLS, Jan. 20—The U. S. Light & Heat Corp. had 75 per cent of its plant capacity devoted to war work, this percentage including 900 employees. The production of their output was apportioned as follows: Batteries, 10 per cent; parts for tanks, 60 per cent; parts for gas shells, 8 per cent; parts for army trucks, 1 per cent; parts for airplanes, 1 per cent, and products for the U. S. Railroad Administration, 5 per cent, making a total of 85 per cent. To carry out this program, fifteen of a group of nineteen buildings were devoted to war work, and it was necessary to make two additions to its plant representing 27,960 sq. ft., besides a new building of 17,000 sq. ft. It has been making only 50 per cent of its normal peace time product.

Delaney Oil Now Lindsay-McMillan Co.

MILWAUKEE, Jan. 20—The Delaney Oil Co., 45-47 Third Street, a large wholesaler and jobber of petroleum products, greases, etc., has changed its name to Lindsay-McMillan Co. The principal owners are Lieut. Walter S. Lindsay and William A. McMillan. The works and storage houses are located at 83 South Water Street.

Manufacturers Hardware Corp. Formed

MILWAUKEE, Jan. 20—The Manufacturers Hardware Corp. has been incorporated with a capital stock of \$100,000 to manufacture and sell machinery, accessories, supplies, etc. Lyle E. Beeman, head of the Universal Mfg. Co., 491 Broadway, manufacturer of farm lighting systems and other direct-connected generating units, is one of the incorporators.

Prest-O-Lite to Rebuild Milwaukee Plant

MILWAUKEE, Jan. 20—The Prest-O-Lite Co., Indianapolis and New York, has awarded contracts for the erection of a new acetylene gas making and compressing plant here to replace the unit which was destroyed by explosion and fire on Nov. 22. The building will be 60 x 120, of fireproof construction.

Gas Tank Plant to Be Rebuilt

MILWAUKEE, Jan. 18—The entire plant of the Gas Tank Recharging Co., 1245 Twenty-third Avenue, was destroyed by explosions and resulting fires on Monday night, Jan. 13, causing an estimated loss of \$50,000. The company will rebuild at once. The plant is used for manufacturing and compressing acetylene gas for the oxy-acetylene welding industry and for other industrial purposes. The main plant of the company is at Keokuk, Iowa, where \$500,000 was invested during 1918 in the erection and equipment of one of the largest carbide works in America.

Vocational School for Willys-Overland

TOLEDO, Jan. 20—The Willys-Overland is to establish a vocational training school for its employees at its plant here.

Current News of Factories**Notes of New Plants—Old Ones Enlarged**

Training will be given in machinist work. The school will occupy a separate department in one of the factories.

New Officers for Turnbull Motors

DEFIANCE, OHIO, Jan. 21—A. F. Mitchell, vice-president of the Northern National Bank of Toledo, was elected president of the Turnbull Motor Truck & Wagon Co. at the company's annual meeting. He succeeded W. O. Allen, general manager of the Allen Motor Car Co., Fostoria, who continues as a member of the board of directors. Other officers elected were: Vice-president, R. G. Holgate, vice-president of the Merchants' National Bank; treasurer and general manager, Charles C. German; secretary, L. J. Spafford; general sales manager, W. L. Krapp; advertising manager, George A. Wieland; chief engineer, H. K. Rienoehl; directors, the officers and T. T. Shaw, C. H. Kettenring, vice-president and general manager of the Defiance Machine Co.; J. G. Schrag, secretary and treasurer of the Screw Machine Products Co.; R. C. May, general sales manager of the Defiance Machine Co.; F. J. Papenhausen, secretary and manager of the Defiance Printing & Engraving Co., and W. O. Allen.

Kramer Increases Capital

GRAND RAPIDS, Jan. 20—F. W. Kramer Motor Co. has increased its capital stock from \$20,000 to \$40,000.

Dividend Declared

Sterling Tire Corp., Rutherford, N. J., 4 per cent quarterly, common; 7 per cent annual, preferred; paid Jan. 15.

Service Motors Declares Dividends

WABASH, Jan. 20—The Service Motor Truck Co. declared a 6 per cent dividend, payable to stockholders of record Dec. 31, 1918, making a total of 15 per cent for the year just closed.

Ford's Manchester, England, Production

In an article in AUTOMOTIVE INDUSTRIES last week it was stated that the Ford Company is producing 3000 cars daily in its Manchester, England, plant. This should have read a total of 3000 cars, parts for which are being imported by special government arrangement.

Nathan Novelty Mfg. Co. in New Factory

NEW YORK, Jan. 21—The Nathan Novelty Mfg. Co. will move to its new factory at the corner of Twelfth Street and Fifth Avenue on or about Feb. 1.

Reo Back to Peace Time Production

LANSING, Jan. 17—Less than 100 government vehicles are incomplete on the contract held by the Reo Motor Car Co. All government parts, equipment and fixtures are being moved from the main plant to the truck plant this week. Moving work will be completed in a few days and the company will by that time have swung back to its own production in its main plant. The last motor for tractors went through the plant several days ago. Assembling of the tractors is all that remains before completing the contract. That no time may be lost in production, the company will this year take a running inventory.

Maibohn Motors to Have Michigan Plant

RACINE, Jan. 16—The Maibohn Motors Co., it is understood, is seeking a location in Michigan. Reports from several cities are that the mayors and Board of Trade heads have received letters asking for privileges in event of locating there. This company's plant was destroyed by fire recently. It was announced that the plant here would be rebuilt.

Long Island City Plant for Phianna

NEW YORK, Jan. 20—The Phianna Motor Co. has leased a factory in Long Island City and has started production on a revised model of the car which it has had on the market during the past year. This will have a four-cylinder 3 29/32 x 6 engine, 125-in. wheelbase and 32 x 4 1/2 tires. The chassis is essentially the same as the previous model and sells for the same price. Bodies are to be custom built, the standard brougham model selling for \$6,000. A slight change has been made in the external appearance of the car through the use of a square radiator.

Templar Enlarges Plant

CLEVELAND, Jan. 20—The Templar Motors Corp. has had erected a three-story, 500 x 72 ft. addition to its plant. It is a concrete structure with the outside walls practically all glass. This increased floor space of almost 2 1/2 acres is now being equipped with machinery.

More Capital for Gardner Machine

BELOIT, WIS., Jan. 20—The Gardner Machine Co. has increased its capital stock from \$500,000 to \$750,000 to cover the extension of its facilities and growth of its business.

New Plants for General Motors

DETROIT, Jan. 20—Rumors are current here that the General Motors Corp. is planning the construction of a new differential gear plant here. The company is also said to have its eye on the Canadian market, and that a big assembly plant may be built soon in some Dominion city.

Contracts Placed

WASHINGTON, Jan. 16—Following are contracts placed by the Motors and Vehicles Division of the Quartermaster Department, under date of Jan. 6, 1919:

Walker Mfg. Co., Racine, 1200 Badger 5-ton truck jacks, \$7560.
Fisk Rubber Co., Washington, 250 casings, \$9100.
Fisk Rubber Co., Washington, 5725 casings, \$20,925.
Winton Motor Car Co., Cleveland, motor parts, \$10,113.54.
United States Tire Co., New York, 385 casings and tubes, \$11,804.25.
Standard Woven Fabric Co., Walpole, motor parts, \$6750.
Silvex Co., South Bethlehem, motor parts, \$11,284.
Goodyear Tire & Rubber Co., Akron, 700 casings, \$25,480.

WASHINGTON, Jan. 16—Following is a list of contracts placed by the Motors and Vehicles Division of the Quartermaster Department:

Jan. 2, 1919.

Kelly-Springfield Tire Co., Akron, 300 casings, \$10,920.
Miller Rubber Co., Akron, 3000 casings, \$31,250.
Locomobile Co. of America, Bridgeport, 180 radiators, \$28,800.
Dodge Bros., Detroit, 30 sets spare parts, \$424,450.

Jan. 4, 1919.

Eisemann Magneto Co., Brooklyn, motor parts, \$16,456.35.
Federal Rubber Co., Washington, 700 bicycle tires and casings, \$5495.
Eisemann Magneto Co., Brooklyn, motor parts, \$5,009.50.
Federal Rubber Co., Cudahy, 3500 bicycle tires, \$13,720.
Firestone Tire & Rubber Co., Washington, 250 tires, \$7582.
Marvel Carburetor Co., Flint, motor parts, \$24,026.40.
Packard Motor Car Co., Detroit, motor parts, \$14,491.60.
Peerless Motor Car Co., Cleveland, motor parts, \$19,923.21.
United States Rubber Co., New York, 900 casings, \$16,345.
The Goodyear Tire & Rubber Co., Akron, 8640 tires, \$344,736.
The Goodyear Tire & Rubber Co., Akron, 1684 tires, \$53,994.38.
The Goodyear Tire & Rubber Co., Akron, tubes and casings, \$26,358.85.
Splitdorf Electrical Co., Newark, motor parts, \$14,500.
Silvex Co., South Bethlehem, 22,500 spark plugs, 15,000 petticoat spark plugs, insulator type plugs, \$8463.

Motor Imports to New Zealand

Fall Off

WASHINGTON, Jan. 22—The motor car, motorcycle, and tricycle trade in New Zealand has fallen off materially during the last 2 years, and will doubtless continue at a lower rate as long as the exceptionally high price of benzine, gasoline, etc., continues, according to a consular report.

However, motor cars are being put to more practical use in the country than ever before, since farmers are using them extensively for different kinds of work about the farm and in transport wherever it is possible, using such attachments and improvements as are now on the market to adapt them to different kinds of work.

The high-water mark was reached in 1916, when the number of cycles imported was 2,287 and the number of motor cars 6,174. The following table gives

the imports for the years 1914 and 1917.

Imports from	1914		1917	
	No.	Value	No.	Value
United Kingdom	2,296	\$191,292	396	\$87,120
United States	189	27,310	970	202,595
All other	15	2,307	....	....
Total	2,500	\$220,909	1,366	\$289,715
<i>Automobiles, Trucks, Etc.</i>				
United Kingdom	1,093	\$1,535,940	72	90,141
Canada	873	482,639	1,010	411,574
France	134	163,513	1	1,722
United States	1,308	1,338,997	3,596	2,597,246
All other	58	103,744	1	730
Total	3,466	\$3,624,833	4,680	\$3,101,413

It will be noted that in 1914 motorcycles and tricycles were nearly all imported from the United Kingdom, while in 1917 a large majority of them came from the United States. This is largely true in regard to motor cars, but not to the same extent, for in 1914 there were 1,093 motor cars imported from United Kingdom, as compared with 72 motor cars in 1917, while from the United States there were 1,308 imported in 1914, as compared with 3,596 in 1917.

These favorable conditions enjoyed by American cars and motorcycles cannot be expected to continue after the closing of the war, and American manufacturers and exporters will need to look carefully after the trade in this part of the world.

Farm Tractors in Tunisia

WASHINGTON, Jan. 22—The Direction de l'Agriculture, du Commerce et de la Colonisation of Tunis is at present making plans for the purchase, on behalf of Tunisian farmers, of a certain number of recent type caterpillar tractors, 45 hp., with their complete plowing outfits, according to a report by the vice-consul.

These caterpillars were bought in the United States some time ago by the French Government for military purposes, but have not been used. They are now placed on sale by the French Government. If the prices can be agreed upon a first lot of 20 tractors is expected to be bought, and other purchases to follow.

An important consideration is that these machines are all of the same type and their upkeep will thereby be simplified, the same interchangeable repair part fitting any of them.

It is not so much the capital involved in the purchase of the tractors that makes the Tunisian farmers hesitate to buy American tractors, but the expenses and difficulties connected with their upkeep and in procuring repair parts.

A number of 75-hp. used caterpillar tractors are also stated to be offered for sale by the French military authorities, and their purchase is being considered.

Boston May Have Truck Show

BOSTON, Jan. 20—Chester I. Campbell has finished his government labors and is again directing the work of the Boston automobile show. The question of a truck show will be decided next week, when a conference is held on the subject.

Foreign Trade Opportunities

WASHINGTON, Jan. 22—Foreign trade opportunities have been received by the Bureau of Foreign and Domestic Commerce as follows. Additional information can be secured from the Bureau by mentioning the opportunity number in each instance:

A man in Italy desires an agency for automobiles, motorcycles and side cars. Foreign Opportunity No. 27967.

A man in France desires an agency for automobiles and trucks. No. 27978.

An agency is desired by a firm in Italy for trucks to be used for passenger service with a carrying capacity of 1½ tons, 30 to 40 hp., and 4 tons, 50 to 70 hp., and also solid rubber tires. No. 28054.

An agency in France for automobile accessories and farm tractors is desired. No. 28051.

A firm in Italy desires an agency for passenger cars and motorcycles. No. 28060.

A man in India desires a farm tractor agency. No. 28066.

An automobile accessory agency is desired by a Frenchman who is now in this country and who desires an agency for Belgium and northern France. No. 28080.

An Italian firm desires an agency for automobile accessories. No. 28081.

A Frenchman desires an agency for motor cars, farm tractors and accessories. No. 28075.

A citizen of Costa Rica, who is at present in the United States, desires an agency for the sale of automobiles and accessories. No. 27958.

An agency is desired by a man in France for the sale of motor cars and accessories through Roumania and the Balkan States. No. 27959.

A firm in France desires to purchase several thousand bicycles and motorcycles and accessories. No. 27988.

A man in Italy desires to secure an agency for the sale of agricultural implements and machinery. No. 28016.

A merchant in Algeria desires to secure an agency for the sale of open and closed automobiles and trucks. No. 28017.

Growth of Italian Automobile Industry

WASHINGTON, Jan. 20—The Italian automobile industry is of great importance, and during the war has given proof of extraordinary development, extending its sphere of action also to the fields of aviation, says the Board of Trade Journal in quoting *Il Tempo*, of Rome. The number of companies engaged in this industry has increased from 32 on Dec. 31, 1913, to 55 at the end of 1917, while the capital employed has risen from \$9,489,231 to \$31,212,160 as shown below:

Departments	Companies	1917
Piedmont	13	\$18,767,840
Liguria	5	1,133,600
Lombardy	25	8,482,080
Venetia	1	80,000
Emilia	1	4,800
Tuscany	2	124,800
Umbria	2	64,640
Lazio	2	468,800
Campania	4	2,085,600
Total	55	\$31,212,160

The average dividend has increased from 3½ per cent in 1913 to 8 per cent in 1917.

As regards foreign trade, the import of automobiles has declined from a value of \$2,611,554.80 in 1913 to \$1,236,784 in 1917 (up to Dec. 13), a falling off of \$1,374,770.80. Exports, however, have increased from \$5,468,949.92 to \$18,511,008.80.

No Visé for Mexican Export Licenses

WASHINGTON, Jan. 18—Applications for export licenses to Mexico will no longer require the visé of an American consul.

Calendar

ENGINEERING

S. A. E. Meetings

Jan. 30—Chicago—"Home-coming" Supper, Morrison Hotel.

Feb. 3—New York—Banquet in honor of Capt. E. V. Rickenbacker, Waldorf-Astoria, Contest Board, American Automobile Association.

Feb. 4-6—New York, Winter Meeting, Society of Automotive Engineers, Engineering Societies' Building.

Feb. 6—Victory Dinner, Hotel Astor, New York.

Feb. 6—Minneapolis Section, S. A. E.—Hotel Radisson, "Radiator Cooling Fans."

March 5—Minneapolis Section, S. A. E.—Hotel Radisson, "Tractor Service and Sales."

April 2—Minneapolis Section, S. A. E.—Hotel Radisson, " Implements Designed for Tractor Belt Power and Their Characteristics."

MOTOR SHOWS

Jan. 20-25—Shreveport, La. Shreveport Automobile Dealers' Assn. Henry B. Marks, Manager.

Jan. 20-25—Hartford, Conn. Broad Street Armory, Auspices of Agricultural Interests.

Jan. 24-30—Milwaukee, Wis. Eleventh Annual, Milwaukee Automobile Dealers, Inc., Auditorium. Bart J. Ruddle, Manager.

Jan. 25-Feb. 1—Chicago. Passenger cars, Coliseum.

Feb. 1-15—New York. Automobile Dealers' Assn. Charles A. Stewart, Manager, Hotel Woodward, Broadway and 55th St.

Feb. 5-6—Chicago. Trucks, Coliseum.

Feb. 4-7—Fargo, N. D. Fargo and Moorhead Automotive Trade Assn.

Feb. 6-15—San Francisco, Cal. Third Annual Pacific Automobile Show, Motor Car Dealers' Assn. of San Francisco. Exposition Auditorium. G. A. Wahlgreen, Manager.

Feb. 10-15—Rochester, N. Y. Rochester Automobile Trades Assn., Exposition Park. George C. Donahue, Manager.

Feb. 15-22—Newark, N. J. N. J. Auto Exhibition Co. Claude Holgate, Manager.

Feb. 15-22—Cleveland, Ohio. Cleveland Auto Show Co. Fred H. Caley, Manager.

Feb. 15-22—Minneapolis, Minn. Minneapolis Auto Trade Assn. Walter B. Wilmot, Manager.

Feb. 15-22—Albany, N. Y. Albany Automobile Dealers' Assn. State Armory.

Feb. 17-22—St. Louis. St. Louis Auto Mfrs. & Dealers' Assn. Robert E. Lee, Manager.

Feb. 17-22—Louisville, Ky. Louisville Auto Dealers' Assn.

Feb. 17-22—Des Moines, Iowa. Tenth Annual, Des Moines Automobile Dealers' Assn. C. G. Van Vliet, Manager.

Feb. 17-22—Pittsfield, Mass. Pittsfield Automobile Dealers' Assn., State Armory. James J. Callahan, Manager.

Feb. 17-22—Passenger Cars; Feb. 24-27, Trucks—South Bethlehem, Pa. Lehigh Valley Auto Shows Co. J. L. Elliott, Manager.

Feb. 17-22—Grand Rapids, Mich. Grand Rapids Automobile Business Assn. E. T. Conlon, Manager.

Feb. 18-22—Baltimore, Md. Baltimore Automobile Dealers' Assn. and Automobile Club of Maryland, Fifth Regiment Armory. H. M. Lucius, General Manager.

Feb. 18-22—Oklahoma City, Okla. Automobile Show. R. H. Haun, Manager.

Feb. 22-Mar. 1—Hartford, Conn. Hartford Automobile Dealers' Assn., Inc., Broad Street Armory. Ben F. Smith, Manager.

Feb. 22-Mar. 1—Atlantic City, N. J. Auto Trades Assn. of Atlantic City.

Feb. 23-March 1—Cedar Rapids, Auditorium, Automobile Dealers' Assn.

Feb. 24-Mar. 1—Burlington, Ia. Second Annual.

Feb. 24-March 1—Kansas City, Mo.—Kansas City Motor Dealers' Assn. E. E. Peake, Manager.

Feb. 24-Mar. 1—Springfield, Mass. Automobile Dealers' Assn. Harry W. Stacy, Manager.

Feb. 24-Mar. 1—Portland, Ore. Ninth Annual, Dealers' Motor Car Assn., Auditorium. M. O. Wilkins, Manager.

Feb. 26-Mar. 1—Mason City, Ia. Fifth Annual, Mason City Auto Show Assn.

Feb. 26-Mar. 1—Madison, Wis. Seventh Annual, Automobile Dealers' Division of Madison Assn. of Commerce, Union Transfer Bldg.

March 1-15—New York. Aeronautical Exhibition, Manufacturers' Aircraft Assn., Madison Square Garden and 69th Regiment Armory.

March—Scranton, Pa. Thirteenth Regiment Armory, Scranton Automobile Assn.

March—Utica, N. Y. Utica Motor Dealers' Assn. W. W. Garabrandt, Manager.

March—Philadelphia, Pa. Philadelphia Automobile Trade Assn. Passenger cars.

March 1-8—Detroit, Mich. Detroit Automobile Dealers' Assn. H. H. Shuart, Manager.

March 3-8—Columbus, O. Columbus Automobile Show Co., Memorial Building. W. W. Freeman, Manager.

March 3-8—Buffalo, N. Y. Buffalo Automobile Dealers' Assn.

Mar. 5-8—Quincy, Ill. Quincy Automobile Trades Assn. Armory.

Mar. 10-15—Paterson, N. J. Paterson Automobile Trade Assn., Fifth Regiment Armory. H. MacGinley, Show Manager.

March 10-15—Syracuse, N. Y. Syracuse Automobile Dealers' Assn. Harry T. Gardner, Manager.

Mar. 10-15—Omaha, Neb. Fourteenth Annual, Omaha Automobile Trade Assn., Auditorium. Clarke G. Powell, Manager.

Mar. 12-19—St. Joseph, Mo. Sixth Annual, St. Joseph Automobile Dealers' Assn.

March 15-22—Boston, Mass. Boston Automobile Dealers' Assn. Chester I. Campbell, Manager.

Mar. 15-22—Harrisburg, Pa. Harrisburg Motor Dealers' Assn., Overland Warehouse. J. Clyde Myton, Manager.

March 17-22—Great Falls, Mont. Montana Automobile Distributors' Assn.

Mar. 19-22—Norfolk, Neb. Norfolk Automobile Show Assn.

Mar. 22-29—Pittsburgh Automobile Dealers' Assn. of Pittsburgh. John J. Bell, Manager.

March 22-29, Passenger Cars; April 1-5, Trucks—Brooklyn, Brooklyn Motor Vehicle Dealers' Assn. I. C. Kirkham, Manager.

Third week March—Trenton, N. J. Trenton Auto Trade Assn. John L. Brock, Manager.

April 5-12—Montreal, Can. National Motor Show of Eastern Canada, Victoria Rink. T. C. Kirby, Manager.

Not decided—Bridgeport, Conn. Auspices of City Battalion. B. B. Steiber, Manager.

Not decided—Indianapolis, Ind. Indianapolis Auto Trade Assn. John B. Orman, Manager.

June 2-6—Hot Springs, Va. Convention, Automobile Equipment Assn., Home-stead Hotel.

TRACTOR SHOWS

Jan. 20-25—Hartford, Conn. Broad Street Armory.

Feb. 15-22—Minneapolis, Minn.

Feb. 24-Mar. 1—Kansas City, Mo. Fourth Annual Tractor Show, Sweeney Building, Kansas City Tractor Club. Guy H. Hall, Sec.

Feb. 18-22—Wichita, Kan. Annual Mid-west Tractor and Thresher Show. Wichita Tractor and Thresher Club. Forum.

CONVENTIONS

Feb. 4-6—New York. Meeting Society Automotive Engineers.

Feb. 25-28—New York. Sixteenth Annual Convention, American Road Builders' Assn.

Detroit War Contract Claims to Be Settled by March 1

DETROIT, Jan. 18—It is understood that every war contract claim in the Detroit district, and there are approximately \$500,000,000 worth of them, will be approved and settled by March 1. Ordnance Department Claim Board officials state that \$100,000,000 in cash has been placed at the disposal of their board to cover all immediate adjustments. Red tape has been abolished and every effort is being made to refund the contractor the money tied up in machinery and materials. Bankers declare that many large checks have already passed through their hands and that contractors affected are entirely satisfied with their settlements. Because of the greater amount of work connected

with the audit and inventory demanded by the Government before an adjustment is made, the larger munitions makers are still busy, and have not submitted their claims.

Aviator Lands on a Roof.

PARIS, Jan. 19—Jules Vedrines won a \$5,000 prize to-day when he made a landing on the roof of the Galeries Lafayette, a large department store near the St. Lazare station. This is said to be the first time an aviator has made a landing on the roof of a building on a flight. Although the machine was slightly damaged, Vedrines was uninjured. The plane he used is 36 ft. wide, and the roof on which he landed is 52 x 75 ft.

Work for Better Roads in Ohio

COLUMBUS, OHIO, Jan. 20—The Good Roads Federation and a number of other organizations held a Road Congress here last week. The Ohio Automobile Trade Association has been taking an active part in this and has appointed a Good Roads Committee, which will cooperate with the Good Roads Federation to secure better roads in Ohio. The association has also appointed a committee of 50, which consists of automobile dealers, who will take up questions pertaining to their own individual business. There are also committees on tires and vulcanizing, garages and repairing, storage batteries, accounting and stock systems, automotive equipment sales, truck sales and legislation.